GUIDE TO ECOLOGICAL RESERVES IN BRITISH COLUMBIA

BC Parks

Ministry of
Environment
and Parks

GUIDE TO ECOLOGICAL RESERVES
IN BRITISH COLUMBIA

Ecological Reserves Program
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PREFACE

The British Columbia Ecological Reserves Program, initiated in the late 1960's was formalized upon passage of the Ecological Reserves Act in 1971 and hiring of permanent staff to coordinate the program in 1974. The major objective of the program is to permanently set aside examples of both representative and unique ecosystems throughout the province. The reserves are intended to serve as natural benchmarks, research areas, outdoor classrooms, and repositories of representative and rare genetic material.

This report is a descriptive catalog of those reserves set aside to date and is oriented primarily toward the interested public. Scientific terminology and detail have been reduced to a minimum. More detailed scientific reports concerning many reserves are on file at Ecological Reserves offices in Victoria (Ecological Reserves Program 1986 a).

The report is assembled in a binder format to allow for up-dating. Information on new reserves or revisions to existing ones will be regularly produced and made available for insertion into the binder.

This publication replaces the 1978 report titled "Ecological Reserves in British Columbia", authored by V.J. Krajina, J.B. Foster, J. Pojar, and T. Carson, and published by the British Columbia Ministry of Environment. A considerable amount of new information has become available for the reserves which existed in 1978 and a number of new reserves have been created, making revision of the 1978 report desirable.

This present report was written by Donald Blood with technical assistance from Mr. Wayne Biggs, Mr. Mark Walmsley, Dr. Charles Low, and staff of the Ecological Reserves Program, particularly Dr. H. Roemer. Mr. Arnold Fraser produced all maps under a separate contract. The Ecological Reserves staff selected photos and developed captions. Mr. Ron Long and the Instructional Media Centre from Simon Fraser University graciously contributed their time and expertise to assemble all photographic materials.

This project was initiated and co-ordinated by Dr. Louise Goulet, Coordinator for the Ecological Reserves Program, with the support of Mr. Derek Thompson, Manager of Planning and Ecological Reserves, Park Programs Branch. Dr. Hans Roemer and Mr. John Pinder-Moss provided technical expertise and support. Finally our thanks to the many volunteer wardens who reviewed the text for their reserve(s) and provided valuable comments.

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1.0 INTRODUCTION

1.1 What are Ecological Reserves?

1.1.1 Evolution of the B.C. Ecological Reserves Program

Between 1964 and 1974 Canada participated in a decade of research known as the International Biological Program (IBP), a worldwide endeavour involving 58 nations. One of several sub-projects within IBP was a program (IBP-CT) aimed at the establishment of a system of representative terrestrial and aquatic ecosystems around the world. In Canada this was largely funded by the National Research Council, and involved the description of biologically important sites on standard international check-sheets. Nearly 1000 checksheets were completed in Canada, placing this country at the forefront of IBP-CT efforts, along with Australia and the United States. Many such sites were identified in British Columbia, and became the nucleus of our present ecological reserves system. The IBP check sheets are still an important, and in some cases the only, source of descriptive information for many British Columbia reserves.

An effective conservation program however requires more than identification and description of important ecosystems. The lands must be legally and permanently set aside if they are to serve their intended long-term function. Since most lands in Canada are under provincial jurisdiction, provincial involvement became necessary to carry the program forward.

The government of British Columbia, encouraged by Dr. Vladimir Krajina (now retired from the University of British Columbia) and other scientists, agreed in 1968 to form an Ecological Reserves Committee to advise on the selection of potential reserve sites. A year later the government formally embarked on setting aside ecological reserves under the Land Act. Then, in 1971, the Legislature gave unanimous approval to the Ecological Reserves Act (Appendix A). With this Act British Columbia became the first province in Canada to formalize and give permanent status to ecological reserves. Quebec, the second to do so, established a similar Act in 1974, New Brunswick in 1975. Other provinces have used existing legislation such as Land, Park and Museum Acts for designation of natural areas.

On May 4, 1971, British Columbia's first 29 reserves received protective status by Order-in-Council, a conservation landmark for the province. A full-time ecological reserves coordinator was hired in 1974, regulations related to use and protection of the reserves were enacted in 1975 (Appendix A), and a volunteer warden program put into effect in 1980.

1.1.2 Objectives and benefits

The basic objective of the Ecological Reserves Program is to permanently preserve natural ecosystems, species, and phenomena. The major users of the reserves are researchers, educators and resource managers, but all of society benefits. This is not a program of conservation for the sake of conservation. Rather it is a very practical program with real long-term benefits for society. These can be better visualized by looking at its objectives in more detail.

1. To keep options open for research into natural ecological processes.

   Ecological reserves serve as permanent outdoor research laboratories for scientific study. To carry out research on a wide range of species and environmental conditions it is necessary to have reserves which contain samples of all major ecosystems in the province. They must be permanently protected sites to allow continuity of research over decades or even centuries. They are needed to unravel and help understand basic and sometimes complex ecological processes such as productivity, diversity, nutrient cycling and energy flow. Intensive short term research is not an acceptable substitute for long-term monitoring. One cannot predict the kind of questions that will be asked of ecological reserves in 10 or 100 years; they must be set aside now in order to provide options for future research and benefit to mankind.

   Research in ecological reserves can have many practical applications. Studies of successful natural tree stands can save a lot of trial and error research in reforestation; research on seabirds can help to predict their susceptibility to oil spills, and so on.

2. To preserve banks or reservoirs of genetic material.

   As man continues to modify the surface of the earth, species of plants and animals may become rare or extinct before they are even known to science. Samples of both rare species and locally adapted common forms must be preserved for future generations since distinctive gene pools are an irreplaceable resource. Many species of plants undoubtedly have as yet undetermined value for horticulture, agricultural crops, drugs, or land reclamation purposes. Reserves containing outstanding examples of species already of economic importance, for example certain trees, are important for development of stock that may be superior in terms of growth form, climatic tolerance, or disease resistance.

3. To provide benchmark areas against which man's modification of the rest of the province can be measured.

   Without natural control areas it is very difficult to assess the long-term environmental impact of land uses like forest harvesting, and how to lessen them. For example, the effects of various logging and silvicultural practices on streamflow, relative to baseline conditions, can be determined if an ecological reserve is present which encloses a complete watershed in a similar ecological zone to that which is logged. This can lead to better management practices.

4. To provide a variety of outdoor classrooms.

   Ecological reserves provide outdoor classrooms in which students or other groups, under permit, may learn about the natural environment. This is particularly important in landscapes which are already extensively modified. The ecological reserve system will allow students to appreciate the full range of ecological types and unique natural features that occur in British Columbia.

1.1.3 Kinds of ecosystems included

Ecological reserves are established primarily for conservation and for scientific research and educational use. They are not another kind of park or recreation area. Although they vary greatly in size, most are small and easily damaged by public use.

The basic purpose of the Ecological Reserves Act is to reserve Crown Land for ecological purposes. The kinds of lands sought reflect the previously listed program objectives, and usually fall into one or more of the following categories:

1. representative samples of the great variety of natural biogeoclimatic zones and subzones which occur in British Columbia, and a range of significant habitats within them,

2. areas needed for scientific research on and demonstration of biological productivity, diversity, and related aspects of the natural environment,

3. examples of ecosystems that have been modified by man and provide an opportunity to study the recovery of the natural system from such modification,

4. areas where rare, endangered, or sensitive plants, animals, and habitats require protection from disturbance,

5. lands or waters that contain unique or special examples of botanical, zoological, or geological phenomena.

1.1.4 The selection and designation process

In the past, areas having potential as ecological reserves have been proposed by staff of the Ecological Reserves Program, university scientists, government resource managers, naturalists, and the concerned public. Many proposals arose from the IBP-CT program; others are more recent. In the future, proposed reserves will fit within a system plan which will ensure coordination with other protected areas and a systematic base. When sufficient information about a potential site is available the proposal is reviewed by program staff and referred to those government agencies and private concerns having an interest in the area for their review. Those reserves which are approved are designated by Cabinet through an Order-in-Council and Gazette notice.

While the Act stipulates that only Crown land may be assigned ecological reserve status, some private lands have been given or leased to the Crown thereby allowing them to be included.

So far many reserves have been selected on the basis of species rarity (phantom orchid), ecosystem vulnerability (seabird colonies) or uniqueness. However, the majority of reserves were selected on the basis of their terrestrial ecosystems representativity. The system of regional ecological classification known as biogeoclimatic zones, initiated in British Columbia by Dr. V.J. Krajina and his students and more recently adopted and refined by the Ministry of Forests and Lands, provides an important framework for selection of representative terrestrial ecosystems. Biogeoclimatic zones are described in Appendix B.

1.1.5 Administration, management, and protection

Staff of the Parks Division of the Ministry of Environment and Parks are responsible for administration of the program subject to provisions of the Ecological Reserves Act and Regulations. These responsibilities include:

- identification and evaluation of suitable ecological reserve areas;
- facilitating the establishment of ecological reserves;
- initiating, encouraging and managing research and educational programs in ecological reserves;
- designing management programs for each ecological reserve; and
- providing up-to-date information concerning the ecological reserves and program.

Most ecological reserves are open to the public for non-destructive pursuits like hiking, nature observation, photography and birdwatching; in a few sensitive reserves supporting nesting seabirds or rare plants a permit is required for entry. The only uses encouraged in the reserves are scientific and educational. Research may only be carried out under permit, and results must be made available to program staff. Under permit, scientists may tag animals, set up recording instruments, or collect certain specimens as long as their research is minimally disruptive.

Lands set aside under the Ecological Reserves Act are excluded from disposition under the Land, Forest, Water, Mineral and other Acts. Regulations under the Ecological Reserves Act (Appendix A) prohibit prospecting for minerals, cutting of timber, livestock grazing, camping, road or trail-building, trapping, hunting, use of motorized vehicles, or removal of flora or fauna. As well, plants or animals cannot be introduced to a reserve, and the discharge of sewage, waste materials, contaminants or any other substance within a reserve is prohibited. These regulations can be enforced by peace officers such as the RCMP and Conservation and Park Officers.

A group of volunteer wardens helps to protect reserves and serves a valuable public information role (Ecological Reserves Program 1986 b). Volunteer wardens represent a wide spectrum of the concerned public - naturalist and conservation clubs, foresters, biologists, and individuals living in the vicinity of Ecological Reserves. They visit reserves in their area, monitor activities in and near the reserves, place and maintain signs, and to report any destructive activities such as vandalism, livestock grazing, all-terrain vehicle use, or tree cutting. Volunteer wardens inform the local public about reserves in their area by providing information and assisting with slide programs or more formal meetings. They may also help with biological inventory and research projects in the reserves. Volunteer wardens do not have the powers of peace officers and are restricted to a role of observing, recording, and reporting. The volunteers are provided with appropriate information and equipment to enable them to successfully carry out their tasks.

In most cases there are no plans to protect ecological reserves from natural intrusions like tree diseases, insect infestation, or even fire, or to control normal plant succession. Natural change, a characteristic of all ecosystems, is of much interest to scientists, and can provide valuable information. Man-caused disruptions however, are controlled where possible. In the case of feral or domestic livestock intrusions, this may involve the fencing of some reserves. Active management of a reserve could, however, be undertaken to maintain a steady state, such as the availability of open meadows for the Vancouver Island marmot.

1.2 Current status of the program

1.2.1 Overview

At present (April 1987) there are 117 established ecological reserves in British Columbia, making this the most successful program of its kind in Canada. The British Columbia program is currently administered by staff of the Planning and Ecological Reserves Section, Park Programs Branch, Ministry of Environment and Parks. The staff is aided by Park staff throughout the province as well as 60 volunteer wardens.

British Columbia's 117 ecological reserves vary in size from 0.6 to 48,560 hectares, with an average size of 1,321 hectares. The total area encompassed is 154,630 hectares, of which nearly one third consists of marine waters. The reserves currently cover 0.1% of the land area of the province. Reserves are located in all regions of the province and contain representative samples of many ecological zones and subzones, as well as unique or special species and ecosystems. Table 1 provides a list of the reserves in numerical order, together with information on their location, main features, and size.

1.2.2 Ecosystem representation

Ecological reserves have been established in all of the 13 biogeoclimatic zones in British Columbia (Appendix C), but some are better represented than others. Many sub-zones, discussion of which is beyond the scope of this publication, are also included. Some reserves contain vegetation typical of two or even three zones. Although several reserves are located in each zone, not all are representative, some being specialized habitats such as bogs, wetlands, lakes, alluvial deciduous forest, or wildflower stands.

Twelve reserves contain significant areas of alpine tundra. Most are in the southern interior and contain other zones as well. Four reserves, two in the northern and two in the southern interior consist almost entirely of alpine habitat. Representation in the southern coastal area is needed.

Only four reserves contain Spruce-Willow-Birch vegetation, however some fairly extensive and representative tracts are included.

Seven reserves contain typical examples of Boreal White and Black Spruce vegetation, two of which consist almost entirely of this type. Four reserves in that zone contain non-typical vegetation associated with valley slopes, bogs, or alluvial sites.

Table 1 - Location and Description of B.C. Ecological Reserves

ER # and Name		Location	Main Feature(s)	Area (ha)
1.	Cleland Island	Clayoquot Sound	Seabird colony	7.7
2.	East Redonda Island	N end of Georgia Strait	Two biogeoclimatic zones with many habitats	6,212
3.	Soap Lake	S of Spences Bridge	Alkaline lake and Douglas fir forest	884
4.	Lasqueti Island	Georgia Strait	Shoreline forest with Rocky Mountain juniper and cactus	201
5.	Lily Pad Lake	S of Lumby	Undisturbed boggy lake on Interior Plateau	101
6.	Buck Hills Road	S of Lumby	Western larch stand	16
7.	Trout Creek	SSW of Summerland	Ponderosa pine parkland and several snake species	75
8.	Clayhurst	S of Clayhurst	Peace River parklands	316
9.	Tow Hill	Graham Island, Q.C.I.	Sandy beach, dunes, swamp and peat bogs	514
10.	Rose Spit	Graham Island, Q.C.I.	Sand dunes and shoreline meadows	170
11.	Sartine Island	One of Scott Islands	Seabird colony	13
12.	Beresford Island	One of Scott Islands	Seabird colony	7.7
13.	Anne Vallee (Triangle Island)	Outermost of Scott Islands	Largest seabird and sea-lion colonies in province	85
14.	Solander Island	Off Cape Cook, Vancouver Island	Seabird colony	7.7
15.	Saturna Island	Strait of Georgia	Coastal Douglas fir forest	131

ER # and Name	Location	Main Feature(s)	Area (ha)
16. Mount Tuam	Saltspring Island	Arbutus-Douglas fir forest	254
17. Canoe Islets	Near Valdes Island	Seabird colony	0.6
18. Rose Islets	Trincomali Channel, N. of Reid Island	Cormorant and gull colony	0.8
19. Mount Sabine	N of Canal Flats	Montane spruce forest	7.9
20. Columbia Lake	E side of Lake	Rare plants on limestone cliffs and along a calcareous stream	32
21. Skagit River Forest	S of Hope	Douglas fir forest	73
22. Ross Lake	S of Hope	Ponderosa pine in a semi-coastal environment	61
23. Moore/McKenney/ Whitmore Islands	Hecate Strait	Seabird colony and Sitka spruce forest	73
24. Baeria Rocks	Barkley Sound	Gull colony and subtidal marine life	53
25. Dewdney and Glide Islands	Hecate Strait	Variety of maritime bog, pond and scrub-forest communities	3,845
26. Ram Creek	East Kootenays	Hotsprings and associated plants; burned forest	121
27. Whipsaw Creek	SW of Princeton	Interior Douglas fir and ponderosa pine stands	32
28. Ambrose Lake	Sechelt Peninsula	Coastal bog lake	228
29. Tranquille	W of Kamloops	Sagebrush, ponderosa pine, Douglas fir plant communities	235

ER # and Name	Location	Main Feature(s)	Area (ha)
30. Vance Creek	N of Lumby	Forest stands transitional between Interior Douglas Fir and Interior Cedar-Hemlock Zones	49
31. Lew Creek	E of Upper Arrow Lake	A complete drainage basin including three biogeoclimatic zones	815
32. Evans Lake	Valhalla Park, E of New Denver	Subalpine forests including disjunct stand of yellow cedar	185
33. Field's Lease	W of Osoyoos Lake	Semi-arid shrub-grassland communities	4.2
34. Big White Mountain	E of Kelowna	Subalpine and alpine plant communities	951
35. Westwick Lake	S of Williams Lake	Aspen parkland vegetation in Cariboo area	27
36. Mackinnon Esker	NW of Prince George	Long compound esker with lichen-woodland communities	583
37. Mount Maxwell	Saltspring Island	Garry oak stand	65
38. Takla Lake	E of Hazelton	Most northerly known occurrence of Douglas fir	263
39. Sunbeam Creek	Near McBride	Alpine vegetation in Rockies	511
40. Kingcome/Atlatzi Rivers	Head of Kingcome Inlet	Rich alluvial swamps, bogs and forest	414
41. Tacheeda Lakes	N of Prince George	Representative sub-boreal spruce forest	526

ER # and Name		Location	Main Feature(s)	Area (ha)
42.	Mara Meadows	E of Salmon Arm	Unique calcareous fen; rare orchids	189
43.	Mount Griffin	N of Mabel Lake	Interior cedar-hemlock and subalpine forest over wide elevational range	1,376
44.	East Copper/ Jeffrey/Rankine Islands	East coast of Moresby Island	Seabird colonies	121
45.	Vladimir J. Krajina (Port Chanal)	West Coast of Graham Island	Virgin littoral environment, lowland Sitka spruce forest, rare mosses, seabird colony, spawning salmon, endemic birds and mammals	9,834
46.	Sikanni Chief River	NW of Hudson's Hope	Engelmann spruce at northern extremity of range. Alpine flora and fauna	2,401
47.	Parker Lake	W of Fort Nelson	Boreal bog habitat. Preservation of Sarracenia purpurea (pitcher plant) and other rare species	259
48.	Bowen Island	W of Apodaca Provincial Park	Forest of Douglas fir and red cedar. Dry subzone of Coastal Western Hemlock Zone	397
49.	Kingfisher Creek	Hunters Range ESE of Sicamous	Subalpine parkland vegetation in Monashee Mountains	1,441
50.	Cecil Lake	NE of Fort St. John	Fen, black spruce bog, and aspen communities	129
51.	Browne Lake	N of McCulloch	Meadow and forest rich in wild flowers	124

ER # and Name	Location	Main Feature(s)	Area (ha)
52. Drizzle Lake	SE of Masset	Lake and bogland; unique species of stickleback; nesting loons	837
53. Narcosli Lake	W of Quesnel	Waterfowl breeding grounds; well developed aquatic communities	1,098
54. Nitinat Lake	Vancouver Island SE of Bamfield	Population of Douglas fir in Coastal Western Hemlock Zone	79
55. Cardiff Mountain	SW of Hanceville	Example of lava plateau, basalt columns and crater lake	65
56. Goosegrass Creek	W of Mica Reservoir	An elevational sequence of three biogeoclimatic zones and a complete watershed	2185
57. Chickens Neck Mountain	N of Dease Lake	Climax stand of white spruce and subalpine fir	680
58. Blue/Dease Rivers	W of Lower Post	Terrestrial and aquatic communities of the Boreal White and Black Spruce Zone	777
59. Ningunsaw River	SE of Bob Quinn Lake	Coastal Western Hemlock Zone near its northern limit; Engelmann Spruce - Subalpine Fir and Alpine Tundra Zones	2,046
60. Drywilliam Lake	S of Fraser Lake	An isolated oldgrowth stand of Douglas fir in the Sub-Boreal Spruce Zone	95

ER # and Name		Location	Main Feature(s)	Area (ha)
61.	Upper Shuswap River	E of Mabel Lake	Excellent alluvial stands of western redcedar	70
62.	Fort Nelson River	NE of Fort Nelson	White spruce developing within alluvial stands of balsam poplar	121
63.	Skeena River	Near confluence of Exchamsiks River	Mature cottonwood stands on floodplain islands	91
64.	Ilgachuz Range	N of Anahim Lake	Isolated mountain mass with alpine - subalpine flora and fauna of biogeographic interest	2,914
65.	Chasm	N of Clinton	Ponderosa pine near its northern limits	197
66.	Ten Mile Point	Victoria	Inter- and subtidal marine life	11
67.	Satellite Channel	Between Saltspring Is. & Saanich Peninsula	Rich subtidal marine life, particularly benthic infauna	343
68.	Gladys Lake	Spatsizi Wilderness Park	Stone sheep, mountain goats and their environment	48,560
69.	Baynes Island	Squamish River	Alluvial black cottonwood forest on undisturbed island	71
70.	Mount Tinsdale	ESE of Barkerville	Extensive transition between alpine and subalpine zones	419
71.	Blackwater Creek	NW of Mackenzie	Boreal forest and portion of extensive low moor area	234

ER # and Name		Location	Main Feature(s)	Area (ha)
72.	Nechako River	W of Prince George	Best stand of tamarack west of Rocky Mountains	133
73.	Torkelsen Lake	W of Babine Lake	Low moor wetlands with cloudberry and rich moss flora	182
74.	U.B.C. Endowment Lands	Vancouver	Second-growth forest of Puget Sound Lowlands	90
75.	Clanninick Creek	Near Kyuquot	Alluvial Sitka spruce	37
76.	Fraser River	W of Chilliwack	Alluvial cottonwood forest on islands	76
77.	Campbell-Brown (Kalamalka Lake)	W side of lake near Rattlesnake Point	Ponderosa pine-bunchgrass site; rattlesnake den	107
78.	Meridian Road (Vanderhoof)	S of Vanderhoof	Engelmann spruce-subalpine fir-lodgepole pine forest	262
79.	Chilako River	S of Vanderhoof, N of Batnuni Lake	Tamarack at its southern limit in B.C.; swamp, fen, and bog mosaic	64
80.	Smith River	Near junction with Liard River	Complete drainage basin with boreal white and black spruce forest	1,326
81.	Morice River	SW of Houston	Burned sub-boreal spruce forest	358
82.	Cinema Bog	NNE of Quesnel	Lowland black spruce-sphagnum bog	68
83.	San Juan Ridge	E of Port Renfrew	Protection of rare white avalanche lily (*Erythronium montanum*)	98
84.	Aleza Lake	"Big Bend" of Fraser River	Sub-boreal spruce forest, lakes, and wetland ecosystems	242

ER # and Name	Location	Main Feature(s)	Area (ha)
85. Patsuk Creek	NW of Mackenzie	Paper birch and other seral forest species	554
86. Bednesti Lake	W of Prince George	Kettle Lake wetland succession	139
87. Heather Lake	NW of Mackenzie	Productive aspen forest	235
88. Skwaha Lake	N of Lytton	Montane and sub-alpine forest with superb flower meadows	850
89. Skagit River	Skagit River Valley	Excellent cottonwood stands	69
90. Sutton Pass	W of Port Alberni	Rare Alder's-tongue fern, (*Ophioglossum vulgatum*)	3.4
91. Raspberry Harbour	W side of Williston Lake	Tall lodgepole pines on excellent growth site	143
92. Skihist	NE of Lytton	Ungrazed ponderosa pine - bunchgrass site	36
93. Lepas Bay	Northern Graham Island, Q.C.I.	Storm-petrel colony on island	3.6
94. Oak Bay Islands	E of Victoria	Spring flowers, rare plants, a seabird colony, and marine life	170
95. Anthony Island	W of Moresby Island, Q.C.I.	Small islets with nine species of nesting seabirds and rich marine life	324
96. Kerouard Islands	S of Moresby Island, Q.C.I.	Major sea-lion rookery, seabird colony and rich marine life	130
97. Race Rocks	Metchosin, Vancouver Island	High-current marine community; winter sea-lion haul-out; nesting seabirds	220

ER # and Name	Location	Main Feature(s)	Area (ha)
98. Chilliwack River	U.S. border, SE of Chilliwack	Mature alluvial forest with large western redcedars	86
99. Pitt Polder	Near Maple Ridge	Two forested hills surrounded by swamp and bog	88
100. Hayne's Lease	N end of Osoyoos Lake	Most arid ecosystem in Canada, including rare plants and animals	101
101. Doc English Bluff	SW of Williams Lake	Limestone cliff with several species of rare flowers and ferns, colony of white-throated swifts, and golden eagle nest	52
102. Charlie Cole Creek	S of Teslin; ESE of Atlin	Cold-water springs used by ungulates as mineral licks	162
103. Byers/Conroy/Harvey/Sinnett Islands	Hecate Strait	Eight species of nesting seabirds; tree-nesting peregrine falcons; extensive subtidal area	12,205
104. Gilnockie Creek	E of Kingsgate in East Kootenays	Mature western larch	58
105. Megin River	NE of Estevan Point, W coast of Vancouver Island	Typical west coast alluvial forests	50
106. Skagit River Rhododendrons	SE of Hope	Two stands of Pacific rhododendrons	70
107. Chunamon Creek	NNE of Germansen Landing, Williston Lake	Two small drainages; Engelmann and white spruce forest on sites of varying productivity	344

ER # and Name	Location	Main Feature(s)	Area (ha)
108. Cougar Canyon	S of Vernon, E side of Kalamalka Lake	Mosaic of dry forest communities; chain of small lakes with associated wetlands	550
109. Checleset Bay	NW of Kyuquot, Vancouver Island	B.C.'s major sea otter population; extensive subtidal environments	34,650
110. McQueen Creek	N of Kamloops	Native grassland with many wildflowers	35
111. Robson Bight	Johnstone Strait, SE of Telegraph Cove	Heavily used killer whale habitat; undisturbed estuary	1,248
112. Mount Tzuhalem	Duncan, Vancouver Island	Garry oak, spring wildflower ecosystems	18
113. Honeymoon Bay	Cowichan Lake, Vancouver Island	Outstanding population of pink fawn lily (*Erythronium revolutum*)	7.5
114. Williams Creek	SE of Terrace	Representative coastal western hemlock forest and outstanding terraced bogs	700
115. Gingietl Creek	30 km upstream of mouth of Nass River	Undisturbed watershed containing coastal western hemlock, mountain hemlock, and alpine vegetation	2,873
116. Katherine Tye (Vedder Crossing)	S of Chilliwack	Rare phantom orchid (*Cephalanthera austinae*)	3.1
117. Haley Lake	SW of Nanaimo	Vancouver Island marmot	93
		TOTAL AREA	154,628.2

Eighteen reserves fall partly or entirely within the extensive Sub-boreal Spruce Zone of the central interior. Several are atypical in that they are dominated by lakes, bogs, or stands of birch, aspen, or tamarack.

The Mountain Hemlock Zone, a coastal subalpine type, is not well represented. Two small reserves on Vancouver Island consist predominantly of this type, while four in other locations contain it as well as other zones. Representation is lacking in the southern Coast Mountains.

The Engelmann Spruce-Subalpine Fir Zone is quite well represented. Relatively typical forest stands predominate in at least ten reserves and cover parts of several others. Engelmann spruce - subalpine fir forests are marginally represented in two other reserves.

Seven ecological reserves contain elements of the Montane Spruce Zone, a zone of fairly limited extent in the southern interior. Trees other than spruce, i.e. lodgepole pine and western larch, are common in several of those reserves.

The Ponderosa Pine Zone is represented in six reserves, although some are transitional to the Interior Douglas Fir or Bunchgrass Zones. These are mostly in settled valleys and average size tends to be small. Much the same is true for the closely associated Bunchgrass Zone. Additional grassland reserves are needed.

The Interior Douglas Fir Zone is quite well represented in the present system. At least seven reserves consist predominantly of typical stands; 11 others are partly covered by Interior Douglas Fir forest or contain marginal examples.

The Coastal Douglas Fir Zone, despite its importance for commercial forestry, is not well sampled in terms of representative forest stands. This is because most lands within it are privately owned. Although 11 reserves are established within this zone, only about four may be considered to contain typical forest stands, and none of these are on southeastern Vancouver Island where the bulk of the zone occurs. The remainder contain atypical forest stands or were established mainly to preserve wildflowers or seabird nesting sites.

Considering its extent, the Interior Cedar Hemlock Zone is not well represented at present. Of six reserves containing elements of this zone, four contain representative forest stands, one is marginally representative, and the sixth is predominantly bogland.

The Coastal Western Hemlock Zone is better represented than any other. About 38 reserves fall entirely or partly within this zone.

Many of these were established to preserve special features like seabird nesting islands, marine environments, or rare or unique plants. Many others contain atypical forest stands (e.g. Sitka spruce; alluvial cottonwoods) or non-forest vegetation (grassy or shrubby islands bogs; lakes). Representative forest stands are well sampled, except on Vancouver island, where this is the predominant forest type.

Intertidal and subtidal marine environments are contained within ten reserves; an additional one is completely subtidal and one has intertidal but no subtidal habitat. High-energy marine environments of the west coasts of Vancouver Island and the Queen Charlottes are included, as well as somewhat more sheltered sites in Hecate Strait, Johnstone Strait, Gulf of Georgia and the Strait of Juan de Fuca.

1.2.3 Unique and rare features

Much progress has been made toward the protection of unique, rare or sensitive ecosystems, habitats, species, and natural phenomena within ecological reserves in British Columbia (Appendix E). Quite a few reserves were created to preserve unique features, while many others contain both unique and representative ecosystems.

Although only a few reserves have been set aside primarily to preserve physical features such as basalt columns or eskers, the system contains many interesting terrain features like alpine glaciers, morraines, patterned ground, caves, sand dunes, sea cliffs, and islands. Sites suitable for the study of processes like formation and erosion of river bars, littoral drift, and slope instability are present. Freshwater features include complete watersheds, alpine tarns, bog lakes, alkaline lakes, hot and cold mineral springs, and a variety of stream types.

Several reserves have as their major purpose the protection of rare or unique plant species or associations, or economically important tree stands on exceptional sites or beyond their normal distribution range. This includes outstanding wildflower stands (mostly on Vancouver Island and the Gulf Islands) and rare plants like the Adder's-tongue fern, several orchids, pitcher plant, and Pacific rhododendron. Sites of exceptional trees include stands of Douglas fir, ponderosa pine, and Engelmann spruce at or beyond their usual northern limits, tamarack beyond its usual southern limits, the only known yellow cedars in interior British Columbia, and exceptional stands of Garry oak, arbutus, paper birch, aspen, black cottonwood, lodgepole pine, western redcedar, and Sitka spruce within their usual zones of occurrence. Wetlands (fens; bogs; swamps; estuaries) are major components of several reserves, while others feature dune ecosystems or limestone vegetation. Several reserves are important because their vegetation has been disturbed and provides opportunities to study long-term recovery.

Seabird colonies are an important and easily disturbed wildlife resource on the British Columbia coast. Most large and/or sensitive colonies are now preserved within 19 ecological reserves. Some of those also contain other unique features like sea lion breeding rookeries or haul-outs (9 reserves), sea otters (1 reserve), subtidal marine environments, or unique island vegetation. One reserve has been set aside primarily for killer whales. Other wildlife features preserved in ecological reserves are nesting eagles and falcons, sandhill crane nesting habitat, endemic insular races of birds and mammals, and snake populations. Big game animals have not yet received much attention, mostly because they require very large reserves and because other forms of protection are available, however one reserve was established to protect mineral springs used as a game lick, another mainly to protect large mammals and their habitat in the Spatsizi area.

Freshwater organisms have not been a major focus of reserve establishment, however one was designated largely to protect unique stickleback populations, three contain spawning runs of salmon, and a third is a site of interesting aquatic insects including several "type" specimens.

Special features of marine reserves include protection of rare invertebrates, communities adapted to heavy surf and strong current environments, and intertidal or benthic habitats of exceptional diversity or productivity.

1.2.4 Research and Education

Research and inventory projects resulting in identifiable reports have been carried out in about half of the reserves, and several involve ongoing studies (Ecological Reserves Program 1986 a). A few reserves have been the subject of considerable research, often on high-profile species such as seabirds (E.R. #1; 13), great blue herons (E.R. #74), sea otters (E.R. #109) or killer whales (E.R. #111), but also involving less spectacular features like the vegetation (several reserves), or sticklebacks (E.R. #97).

Both universities and government agencies are presently using ecological reserves for long-term monitoring of such diverse biotic features as benthic marine invertebrates, insects, and forest stands.

Several reserves are of considerable importance because of their proximity to research institutions like the University of British Columbia (E.R. #74), University of Victoria (E.R.'s #66, 67, 94), Bamfield Marine Station (E.R. #24), and Lester Pearson College of the Pacific (E.R. #97). These, and others, presently serve as important teaching aids for school and university staff, and as undisturbed locations for graduate students to carry out thesis research. This kind of use is expected to increase in future.

1.3 About this book

1.3.1 Sources of information

Primary sources included the 1978 report "Ecological Reserves in British Columbia" (E.R.'s 1-92) and several kinds of documentation housed at Ecological Reserves Program offices:

- formal research reports, available for about half of the reserves, including both unpublished reports and journal papers;
- files containing species lists, survey data, IBP check-sheets, Orders-in-Council, and related notes;
- black and white (in a few cases color) aerial photos for each reserve, including stereo coverage;
- photos (prints and slides) taken by staff or researchers, available for most reserves.

Topographic maps and marine charts of the most detailed available scale aided in describing location, size, and physical features. Additional sources of information primarily included regional treatments not prepared strictly for ecological reserve purposes, i.e. geological and soils maps, forest cover maps, Canada Land Inventory and wildlife biophysical mapping, seabird nesting maps and atlas, government wildlife survey data and reports, various marine surveys (oceanography; kelp; herring), salmon spawning statistics, status reports on rare and endangered species, and various environmental impact studies.

1.3.2 The descriptive text

A one or two-page text is presented for each established reserve. Information for ecological reserve proposals (ERP's) is not included. Reserves are numbered in order of date of establishment and presented in that order in the report. Table 2 lists the reserves in alphabetical order, and Figure 1 indicates their general location in British Columbia.

The stated purpose of each reserve is the major but not always the only reason that it was given ecological reserve status. Where the description of reserve location includes distance measurements, these are always in a straight line.

Most reserves do not have legally surveyed boundaries; their size is as stated by the Order-in-Council which created them. Areas are given to the nearest hectare, or nearest one-tenth hectare if under 10 hectares in size. Latitude and longitude were obtained from published topographic maps or marine charts and are given to the nearest minute for the approximate centre of each reserve, except for very large reserves where a range is given. Elevation ranges are from

1:25,000, 1:50,000 or 1:250,000 topographic maps, depending on availability, rounded to the nearest 10 or 100m. Elevations for some coastal islands and rocks were obtained from the British Columbia Pilot (Vol. 1, 1965). For reserves having a subtidal component, elevation limits begin with a negative figure determined from bathymetry on marine charts.

Assignment to a biogeoclimatic zone was based on description of vegetation in the reserves, plus reference to generalized Biogeoclimatic Zone mapping for British Columbia and more detailed mapping prepared by the Ministry of Forests and Lands for the Vancouver (1:500,000) and Prince George (1:600,000) Forest Regions (Maps of that scale are not yet available for other regions). Names currently used by the Ministry of Forests and Lands are followed.

For most reserves the text is a condensed version of available information. It is written in as non-technical a style as possible, using accepted common names for plants and animals except where these are not available or are too ambiguous. Both common and scientific plant names are listed in Appendix D. Sources of common names were as follows: vascular plants other than rare species (Meidinger 1984); rare vascular plants (Straley et al. 1985); birds (Godfrey 1986); mammals (Cowan and Guiguet 1965); reptiles (Gregory and Campbell 1984); amphibians (Green and Campbell 1984); fish (Hart 1973; Carl et al. 1967). Most lower plants are referred to simply as mosses, lichens etc., but where specific names seemed useful the scientific name is given. In the case of marine invertebrates, some of which are conspicuous and have common names while others do not, common names have been used where available, based on a variety of sources.

In many cases information on the flora and fauna is of a preliminary nature, based on reconnaissance surveys only. Description of vegetation, with the exception of rare plants, is largely limited to dominant or characteristic species and major communities. The terms community, association, and vegetation type are used interchangeably for the sake of variety. Wildlife information is also confined to major or unusual species, or a few representative ones. Inventory information for wildlife, for example numbers of nesting seabirds, is meant only as a general indication of abundance. Assignment of rare or endangered status for vascular plants is based on Straley et al. (1985), and for birds and mammals on Cook and Muir (1984) and Munro and Low (1979).

Application numbers are numbers given to each site, in chronological order, as they are proposed for consideration by program staff. These now total several hundred. Order-in-Council numbers are those registered at the time a site is designated by Cabinet as an ecological reserve. In a few cases where boundaries have been altered since original designation, a second or third Order-in-Council number may be included. Map numbers refer to the National Topographical System, marine chart numbers to the Canadian Hydrographic Service Pacific Coast Catalogue of nautical charts.

Information on access to reserves is usually quite general. Readers should be aware that the access situation can change rapidly as roads fall into disrepair or new roads are built.

1.3.3 Maps

A map is included with the text for each reserve. Scales vary from 1:25,000 to 1:250,000 depending on coverage available and reserve size, but most are 1:50,000 topographic maps. Contours on the maps may be in either metric or imperial units. Latitude and longitude are indicated on map margins. All maps are oriented with north at the top unless otherwise indicated. Reserve boundaries are shown as accurately as scale will permit, usually following heights of land, shorelines or streams. Some are partially or entirely enclosed by straightline boundaries which follow lot lines or lines of latitude or longitude. Legal, or metes and bounds descriptions, are included with Orders-in-Council but not presented in this report.

1.4 References

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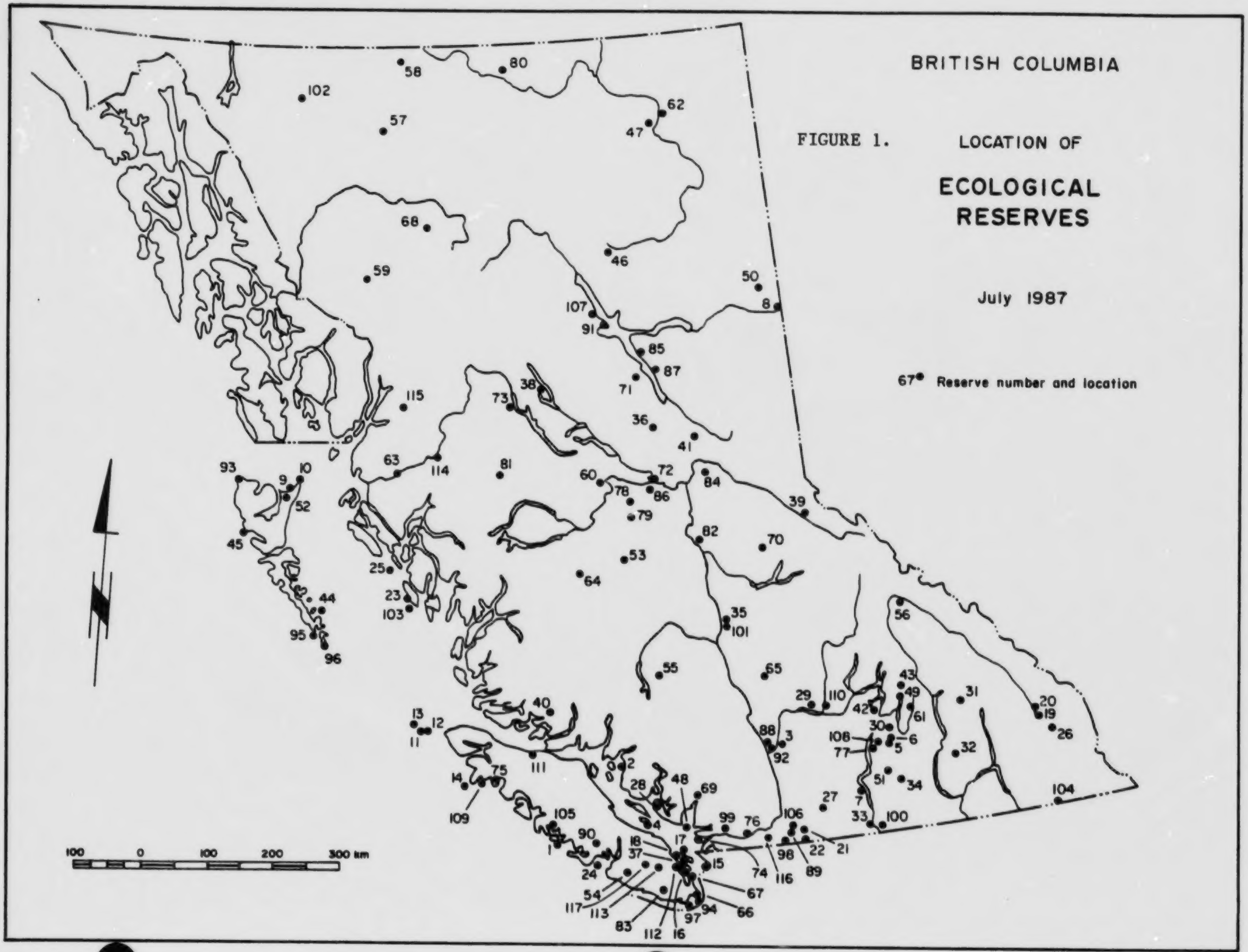
2.0 LOCATION AND DESCRIPTION OF B.C. ECOLOGICAL RESERVES

BRITISH COLUMBIA

FIGURE 1. LOCATION OF

ECOLOGICAL RESERVES

July 1987


67● Reserve number and location
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66
67

TABLE 2 - Alphabetical list of B.C.Ecological Reserves

Name	ER #
Aleza Lake	84
Ambrose Lake	28
Anne Vallee (Triangle Island)	13
Anthony Island	95
Baeria Rocks	24
Baynes Island	69
Bednesti Lake	86
Beresford Island	12
Big White Mountain	34
Blackwater Creek	71
Blue/Dease Rivers	58
Bowen Island	48
Browne Lake	51
Buck Hills Road	6
Byers/Conroy/Harvey/ Sinnett Islands	103
Campbell-Brown (Kalamalka Lake)	77
Canoe Islets	17
Cardiff Mountain	55
Cecil Lake	50
Charlie Cole Creek	102
Chasm	65
Checleset Bay	109
Chickens Neck Mountain	57
Chilako River	79
Chilliwack River	98
Chunamon Creek	107
Cinema Bog	82
Clanninick Creek	75
Clayhurst	8
Cleland Island	1
Columbia Lake	20
Cougar Canyon	108
Dewdney and Glide Islands	25
Doc English Bluff	101
Drizzle Lake	52
Drywilliam Lake	60
East Copper/Jeffrey/ Rankine Islands	44
East Redonda Island	2
Evans Lake	32
Field's Lease	33
Fort Nelson River	62
Fraser River	76
Gilnockie Creek	104
Gingietl Creek	115
Gladys Lake	68
Goosegrass Creek	56
Haley Lake	117
Hayne's Lease	100
Heather Lake	87
Honeymoon Bay	113
Ilgachuz Range	64
Katherine Tye (Vedder Crossing)	116
Kerouard Islands	96
Kingcome/Atlatzi Rivers	40
Kingfisher Creek	49
Lasqueti Island	4
Lepas Bay	93
Lew Creek	31
Lily Pad Lake	5
Mackinnon Esker	36
Mara Meadows	42
McQueen Creek	110
Megin River	105
Meridian Road (Vanderhoof)	78
Moore/McKenney/Whitmore	23
Morice River	81
Mount Griffin	43
Mount Maxwell	37
Mount Sabine	19
Mount Tinsdale	70
Mount Tuam	16
Mount Tzuhalem	112
Narcosli Lake	53
Nechako River	72
Ningunsaw River	59
Nitinat Lake	54
Oak Bay Islands	94

Parker Lake	47
Patsuk Creek	85
Pitt Polder	99
Race Rocks	97
Ram Creek	26
Raspberry Harbour	91
Robson Bight	111
Rose Islets	18
Rose Spit	10
Ross Lake	22
San Juan Ridge	83
Sartine Island	11
Satellite Channel	67
Saturna Island	15
Sikanni Chief River	46
Skagit River Cottonwoods	89
Skagit River Forest	21
Skagit River Rhododendrons	106
Skeena River	63
Skihist	92
Skwaha Lake	88
Smith River	80
Soap Lake	3
Solander Island	14
Sunbeam Creek	39
Sutton Pass	90
Tacheeda Lakes	41
Takla Lake	38
Ten Mile Point	66
Torkelsen Lake	73
Tow Hill	9
Tranquille	29
Trout Creek	7
U.B.C. Endowment Lands	74
Upper Shuswap River	61
Vance Creek	30
Vladimir J. Krajina (Port Chanal)	45
Westwick Lake	35
Whipsaw Creek	27
Williams Creek	114

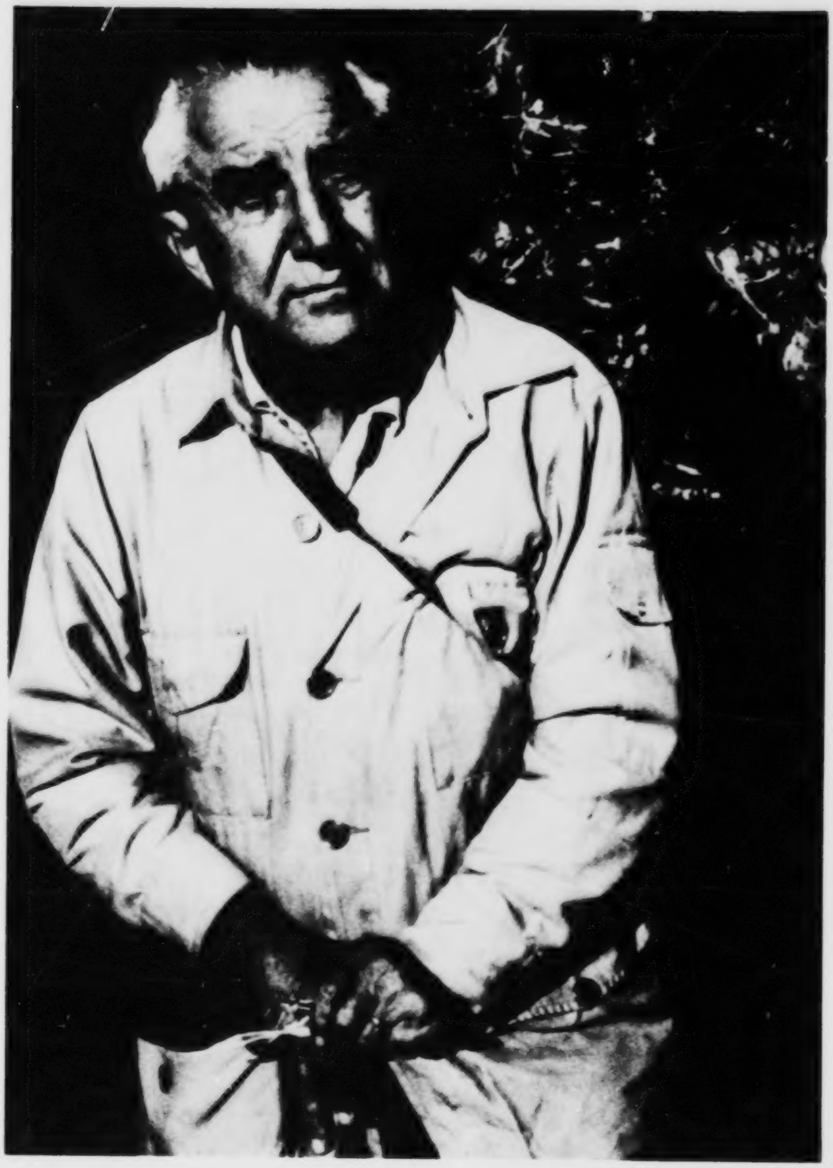

Figure 2. Dr. Vladimir J. Krajina and the B.C. Ecological Reserves Program

Dr. Vladimir J. Krajina may be considered the most important personality in the history of British Columbia's ecological reserves. Starting in 1964, he coordinated the volunteer efforts of British Columbian scientists under the International Biological Programme to select and describe many of the province's significant ecosystems. In 1968, Dr. Krajina was instrumental in convincing the government of the day to protect the first of these areas and later make Ecological Reserves a provincial government program. (Photo B. Foster)

CLELAND ISLAND

E.R. #1

PURPOSE: To protect breeding populations of many species of seabirds

LOCATION: 14 km W of Tofino, off west coast of Vancouver Island

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SIZE: 7.7 ha LAT: 49°10'N LONG: 126°05'W ELEVATION: 0 - 25m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

The reserve comprises a single low-lying basalt island with a central vegetated area rimmed by bare rock. Soils, mainly sands, are strongly affected by ocean spray.

BIOTIC FEATURES:

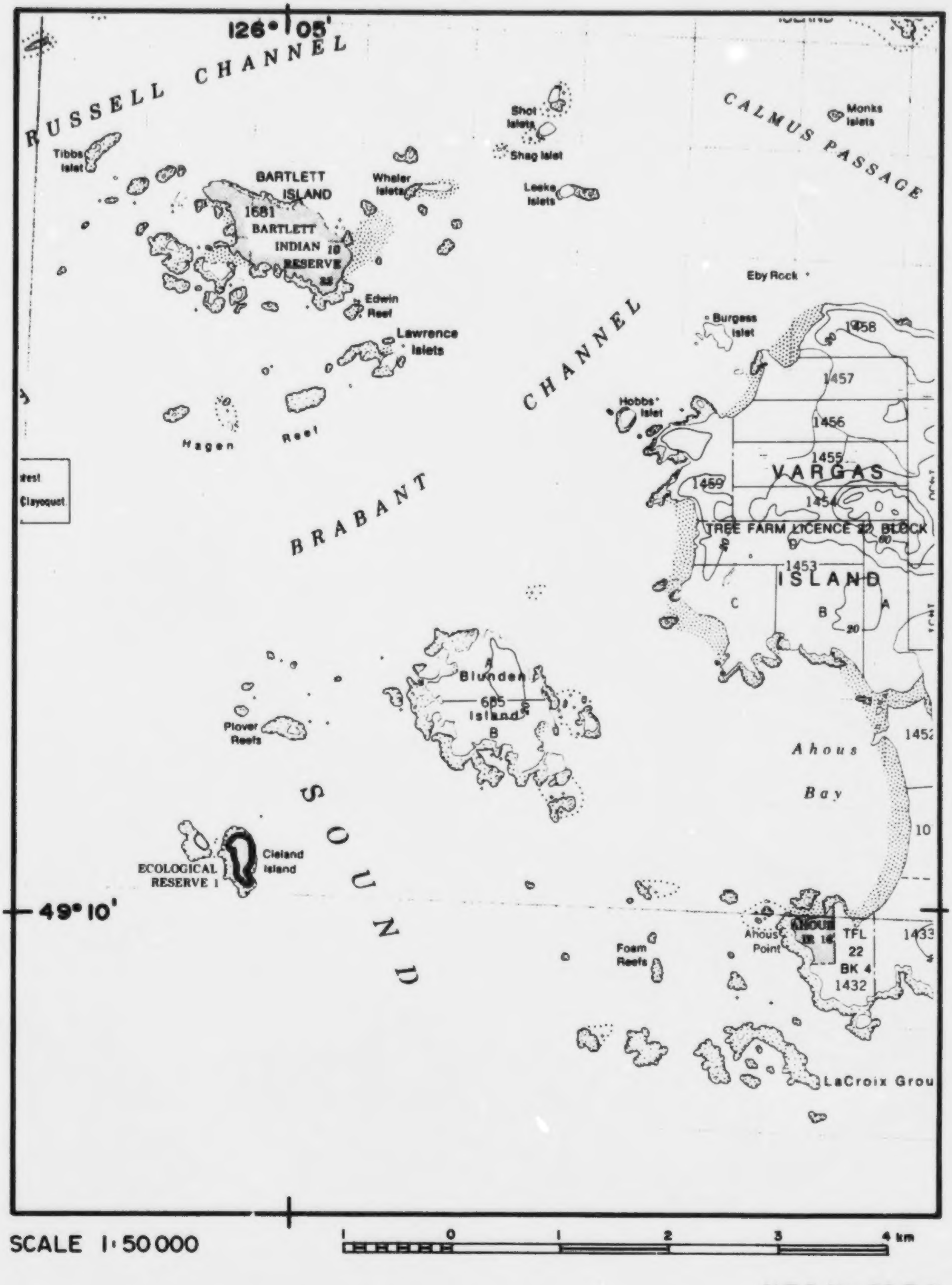
The vegetation consists of a central shrubby core and a surrounding belt of grasses. The exposed portions, especially on the outer edges of the island, have only scattered plant cover. The dense shrubs of the core are salmonberry, Nootka rose, and coast black gooseberry growing to 2 m tall. The surrounding grassy belt is composed mostly of dune wildrye and broadleaved herbs. The rocky outcrops are characterized by Tracy's mistmaiden, and villous cinquefoil. Three minor vegetation types are those of silverweed and seabeach sandwort on shell beaches, of slough sedge on a seepage site, and of salal on higher ground.

The grass belt provides nesting sites for Leach's storm-petrel, fork-tailed storm-petrel, tufted puffin, rhinoceros auklet and Cassin's auklet which tunnel into the sandy soil. The bare rocks, beach logs and general surface of the island are home to pigeon guillemot, glaucous-winged gull, black oystercatcher, pelagic cormorant and a few common murres. Oystercatchers feed on invertebrates found in great abundance in the intertidal zone. Beach logs provide habitat for the clouded salamander.

OUTSTANDING FEATURES: Great species diversity of seabirds relative to small size of island; one of the largest concentrations of Leach's storm-petrels and of oystercatchers; largest puffin colony south of Triangle Island; largest colony of rhinoceros auklets off the west coast of Vancouver Island; important stop-over point for migrating shorebirds.

OTHER INFORMATION: Order-in-Council no. 1563, 4 May 1971. Application no. 13. Map no. 92 E/1. The island is accessible by water but is closed to the public by Order-in-Council (no. 1920, 16 June 1977) to protect vulnerable breeding seabirds and their habitat. A permit is required to land on the island.

Two Ph.D. dissertations on the black oystercatcher as well as publications and reports on oystercatchers, limpets, and rhinoceros auklets are available. Seabird population surveys are conducted yearly by the Canadian Wildlife Service.


126° 05'
RUSSELL CHANNEL
Tibbs Islet
BARTLETT ISLAND
1681
BARTLETT INDIAN RESERVE
10
Whaler Islets
Shot Islets
Shag Islet
Leeke Islets
CALMUS PASSAGE
Monks Islets
Edwin Reef
Lawrence Islets
Hagen Reef
Eby Rock
Burgess Islet
CHANNEL
BRABANT
Hobbs Islet
1458
1457
1456
1455
1459
1454
1453
VARGAS
TREE FARM LICENCE 22 BLOCK
ISLAND
A
B
C
D
Blunden Island
685
Plover Reefs
SOUND
Ahous Bay
1452
ECOLOGICAL RESERVE 1
Cleland Island
49° 10'
Foam Reefs
Ahous Point
TFL 22 BK 4
1432
1433
LaCroix Grou
West
Clayoquot
SCALE 1:50000
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1
2
3
4 km

N.T.S. No. 92 E/1

ECOLOGICAL RESERVE No. 1
CLELAND ISLAND

EAST REDONDA ISLAND E.R. #2

PURPOSE: To conserve representative coastal ecosystems of two biogeoclimatic zones, principally for forestry research in first and second growth stands

LOCATION: 40 km NW of Powell River, between Homfray Channel and Pendrell Sound, at the entrance to Toba Inlet

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SIZE: 6,212 ha LAT: 50°14'N LONG: 124°41'W ELEVATION: 0 - 1570m

BIOGEOCLIMATIC ZONES: Coastal Western Hemlock; Mountain Hemlock

PHYSICAL FEATURES:

The reserve comprises the massif of Mt. Addenbroke and occupies the entire eastern lobe of East Redonda Island. Most of the terrain is steep and rocky. Shallow soils are common. A variety of slope exposures is present.

BIOTIC FEATURES:

At lower elevations within the Coastal Western Hemlock Zone the forests are dominated by Douglas fir with hemlock and western redcedar as secondary species. A shore (lodgepole) pine - moss/lichen community occupies dry rocky sites. On wetter sites, plant communities range from Douglas fir - salal, Douglas fir - hemlock - moss, and cedar - sword fern, to cedar - skunk cabbage. The driest slopes near the shoreline show vegetation transitional to the Coastal Douglas Fir Zone. Mid-elevations are occupied by a variety of hemlock and amabilis fir forests with understoreys of huckleberry species, salal, deer fern and mosses.

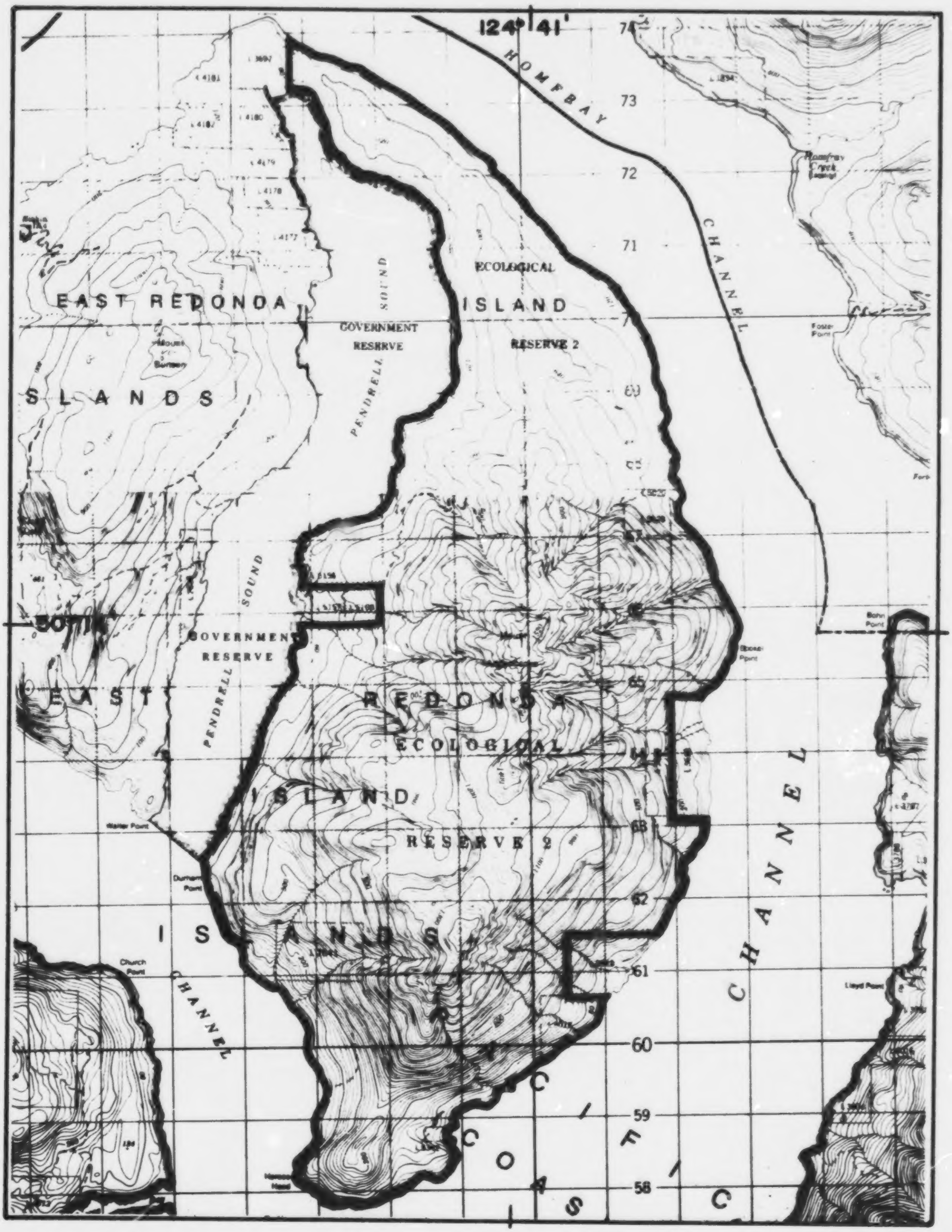
The subalpine Mountain Hemlock Zone supports forests of mountain hemlock, amabilis fir, and yellow cedar, as well as subalpine parkland where dwarfed clumps of these trees alternate with huckleberry, mountain-heather and black alpine sedge communities. The last two communities are transitional to the Alpine Tundra Zone which is only marginally represented.

Wildlife records on the reserve include black bear, black-tailed deer, turkey vulture and blue heron. Wolf and cougar, as well as many species of smaller mammals and birds, are presumed to be present.

OTHER FEATURES: Coast Salish rock paintings are found on cliffs near the ocean. Most lower slopes, especially at the island's south end, have been logged. A few private lots occupy a small portion of the island's east shore.

OTHER INFORMATION: Order-in-Council no. 1564, 4 May 1971. Application no. 4. Map no. 92 K/2; K/7. The island is accessible by boat, but little disturbance has resulted from recreational boaters. Some information is available on a few archeological sites and petroglyphs location on the island. Arbutus, and the rare bristly manzanita (Arctostaphylos columbiana), occur here near the northern limit of their range.

2-2B


124° 41'
HOMFRAY
CHANNEL
EAST REDONDA
ISLANDS
ECOLOGICAL
ISLAND
RESERVE 2
GOVERNMENT
RESERVE
PENDRELL SOUND
50°17'
EAST REDONDA
ECOLOGICAL
ISLAND
RESERVE 2
ISLANDS
CHANNEL
PACIFIC COAST
CHANNEL
Walter Point
Durham Point
Church Point
Foster Point
Lloyd Point
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72
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SCALE 1:75000

1 0 1 2 3 4 km

N.T.S. No. 92K/2,7

ECOLOGICAL RESERVE No. 2
EAST REDONDA ISLAND

SOAP LAKE

E.R. #3

PURPOSE: To conserve an alkaline lake, its associated flora and fauna, and representative ecosystems of the Interior Douglas Fir Zone

LOCATION: 3 km SSE of Spences Bridge, on the Nicomen Plateau

SIZE: 884 ha LAT: 50°22'N LONG: 121°19'W ELEVATION: 670 - 1250 m

BIOGEOCLIMATIC ZONES: Interior Douglas Fir; Ponderosa Pine

PHYSICAL FEATURES:

Soap Lake, about 15 ha in size and located in a shallow valley in the center of the reserve, is very alkaline (pH 9.1) due to high evaporation and limited outflow. A band of encrusted salts up to 6 m wide occurs around the lake edge, and two alkaline ponds occur to the east of the lake. Gently sloping mountains with a variety of slope exposures rise to the north and south of the lake; upper slopes of the Nicola Valley occur in the northeast corner.

BIOTIC FEATURES:

The shores of Soap Lake and adjacent ponds support concentric bands of plants which are adapted to high alkalinity. The most common species here are Nuttall's alkaligrass, saltgrass, foxtail barley, and pahute weed. A treeless community dominated by big sage, bluebunch wheatgrass and arrow-leaved balsam-root occurs as a fringe around the lake and ponds adjacent to the alkaline zone, on southeast-facing slopes in the northern part of the reserve, and on the slopes of the Nicola Valley. Other dry, low-elevation slopes support ponderosa pine stands with an understory of wheatgrass and balsam-root. Douglas fir communities cover much of the reserve area; dominant understory species vary from bluebunch wheatgrass in open fir stands to pinegrass in closed stands and snowberry in moist draws. A small stand of trembling aspen, willow, and water birch occurs near the ponds.

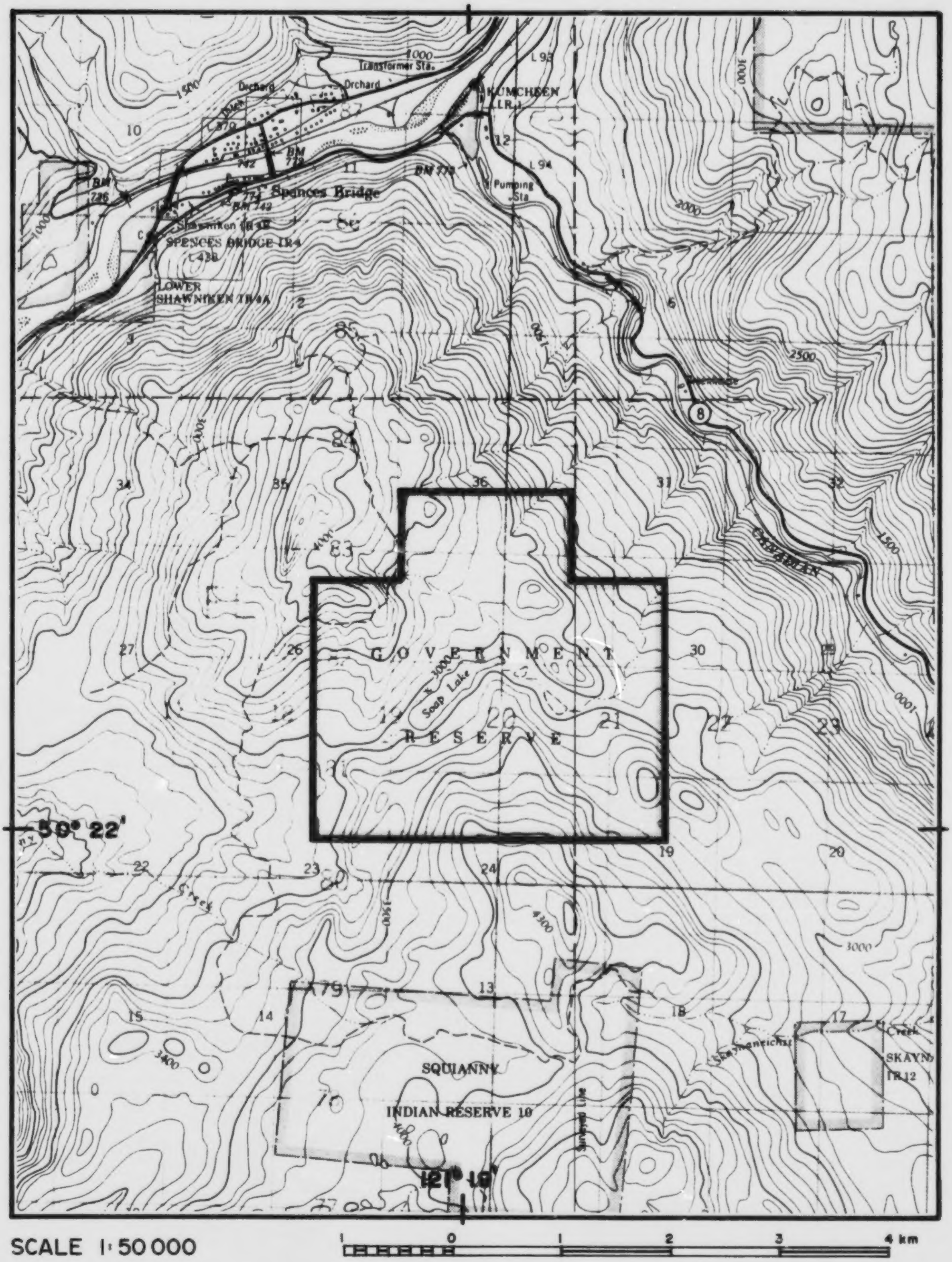
Mammals recorded in the reserve include mule deer, black bears, coyotes, and pocket gophers. Many shrubs are heavily browsed by deer. A variety of dry forest birds is present, and killdeers occur around the shoreline.

Interesting invertebrates associated with the alkaline lake are swarms of brine flies around its margin and brine shrimp in the lake itself.

OUTSTANDING FEATURES: An alkaline lake and specialized plants and invertebrates associated with it.

OTHER INFORMATION: Order-in-Council no. 1565, 4 May 1971. Application no. 32. Map no. 92 I/6. Four-wheel-drive access is possible from the Trans Canada Highway in good weather. Cattle grazing has occured for many years and continues, and knapweed has invaded along the dirt access road.

A descriptive list of the major plant communities is available.


Transformer Sta.
Orchard
KUMCHEEN I.R.1
Spences Bridge
SPENCES BRIDGE IR4
LOWER SHAWNIKEN IR4A
Pumping Sta.
GOVERNMENT RESERVE
Soap Lake
SQUIANNY INDIAN RESERVE 10
SKAYN IR12
50° 22'
121° 18'
8
2000
2500
1500
3000
4300
3400

SCALE 1:50 000

1 0 1 2 3 4 km

N.T.S. No. 92 I/6

ECOLOGICAL RESERVE No. 3
SOAP LAKE

LASQUETI ISLAND

E.R. #4

PURPOSE: To protect vegetation and fauna characteristic of the dry subzone of the Coastal Douglas Fir Zone

LOCATION: Lasqueti Island, Strait of Georgia, 15 km N of Parksville

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SIZE: 201 ha LAT: 49°28'N LONG: 124°17'W ELEVATION: 0 - 240 m

BIOGEOCLIMATIC ZONE: Coastal Douglas Fir

PHYSICAL FEATURES:

The reserve contains a rocky, irregular hill with slope exposure to the south and east, the steepest slopes, including cliffs to 30 m in height, being near the shoreline. About 2 km of shoreline is included. Large areas of bare volcanic bedrock are exposed on hill tops, steep slopes, and along the shoreline. Significant soil formation is limited to a few narrow draws and small valleys, and to less rugged terrain near the north boundary. A small peninsula and a cove are present along the eastern shoreline.

BIOTIC FEATURES:

As a result of southerly exposure, sea level location, and thin soils, the vegetation here is representative of the very driest habitats within the dry subzone of the Coastal Douglas Fir forest. Most of the reserve is covered with open stands of Douglas fir, arbutus, and shore (lodgepole) pine, interspersed by mossy, grassy, or bare rock openings. Western redcedar, western hemlock and red alder occur in a few moist draws, and wetland plants in three small swamps. Rocky mountain juniper, including specimens of record size, is common near the shoreline, in association with other dry-site plants like prickly-pear cactus, entire-leaved gumweed, early hairgrass, and soft brome.

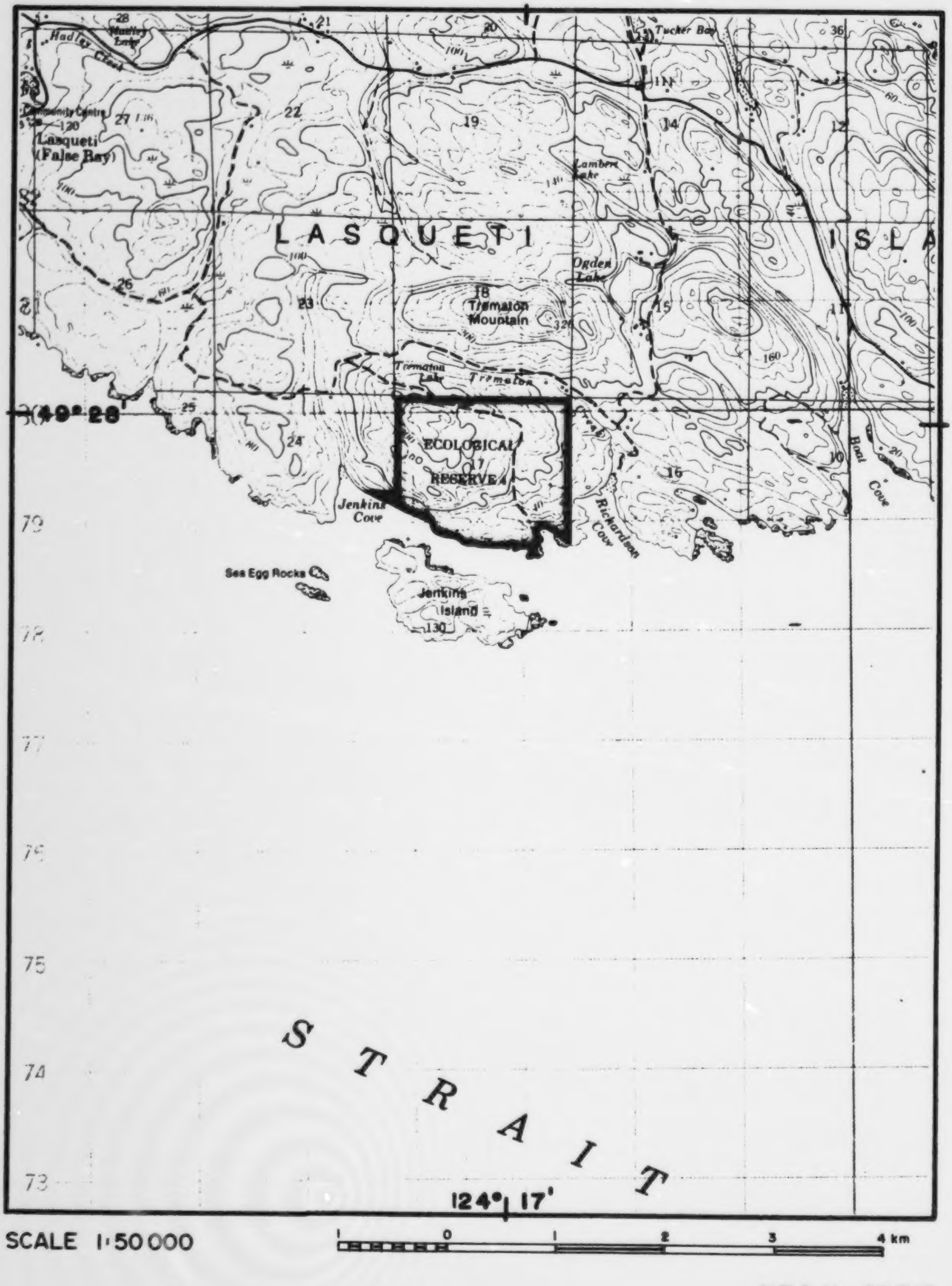
At least 15 plants considered rare in the province occur here. Most are limited in distribution to the dry subzone of the Coastal Douglas Fir Zone, but may be fairly common within that subzone. This restricted distribution rather than small population size results in most of those plants being in the category of least concern.

Numerous birds have been recorded, some of the more notable being the turkey vulture, bald eagle, osprey, great horned owl, pygmy owl, and pigeon guillemot. Native land mammals are few, being limited to the wandering shrew, Townsend vole, deer mouse, mink, raccoon, and black-tailed deer. River otters occur along the shoreline. The Pacific tree frog, northern alligator lizard, wandering garter snake, and northwestern garter snake have been recorded.

OUTSTANDING FEATURES: Rare plants and record-sized Rocky Mountain junipers associated with the driest habitats in the Coastal Douglas Fir Zone.

OTHER INFORMATION: Order-in-Council no. 1566, 4 May 1971. Application no. 6. Map no. 92 F/8.

Much of the reserve was selectively logged in the 1960's, and old logging roads are present. Vegetation in many areas has been severely affected by feral sheep and goats. Part of the reserve is now fenced.


Hadley Creek
Mallard Lake
Community Centre
Lasqueti (False Bay)
LASQUETI ISLA
Tucker Bay
Lambert Lake
Ogden Lake
Trematon Mountain
Trematon Lake
ECOLOGICAL RESERVE
Jenkins Cove
Richardson Cove
Boat Cove
Sea Egg Rocks
Jenkins Island
49° 28'
124° 17'
STRAIT

SCALE 1:50 000

N.T.S. No. 92 F/8

ECOLOGICAL RESERVE No. 4
LASQUETI ISLAND

LILY PAD LAKE

E.R. #5

PURPOSE: To conserve an undisturbed highland lake with associated flora and fauna in the southern interior of B.C.

LOCATION: NE of Nicklen Lake, 12.5 km S of Lumby

SIZE: 101 ha LAT: 50°09'N LONG: 118°58'W ELEVATION: 1370 - 1400 m

BIOGEOCLIMATIC ZONE: Montane Spruce

PHYSICAL FEATURES:

The reserve features a small, shallow lake on the Okanagan Highland plateau. The latter is characterized by low hills with gentle slopes, sited on a morainal blanket of boulder clay.

BIOTIC FEATURES:

A young forest established after fire surrounds the lake. Lodgepole pine dominates, but smaller areas are also occupied by Engelmann spruce, trembling aspen, mountain and Sitka alder. White spruce, subalpine fir, Douglas fir, western larch and western redcedar are uncommon. The shrub and/or herb layers are dominated by one, or a combination of the following species (dry to wet): pinegrass, arctic lupine, twinflower, bunchberry, black gooseberry, common horsetail. Plant species diversity is high.

The aquatic vegetation is dominated by waterlily, pondweeds, coontail, and algae. Sedges are abundant along the shore.

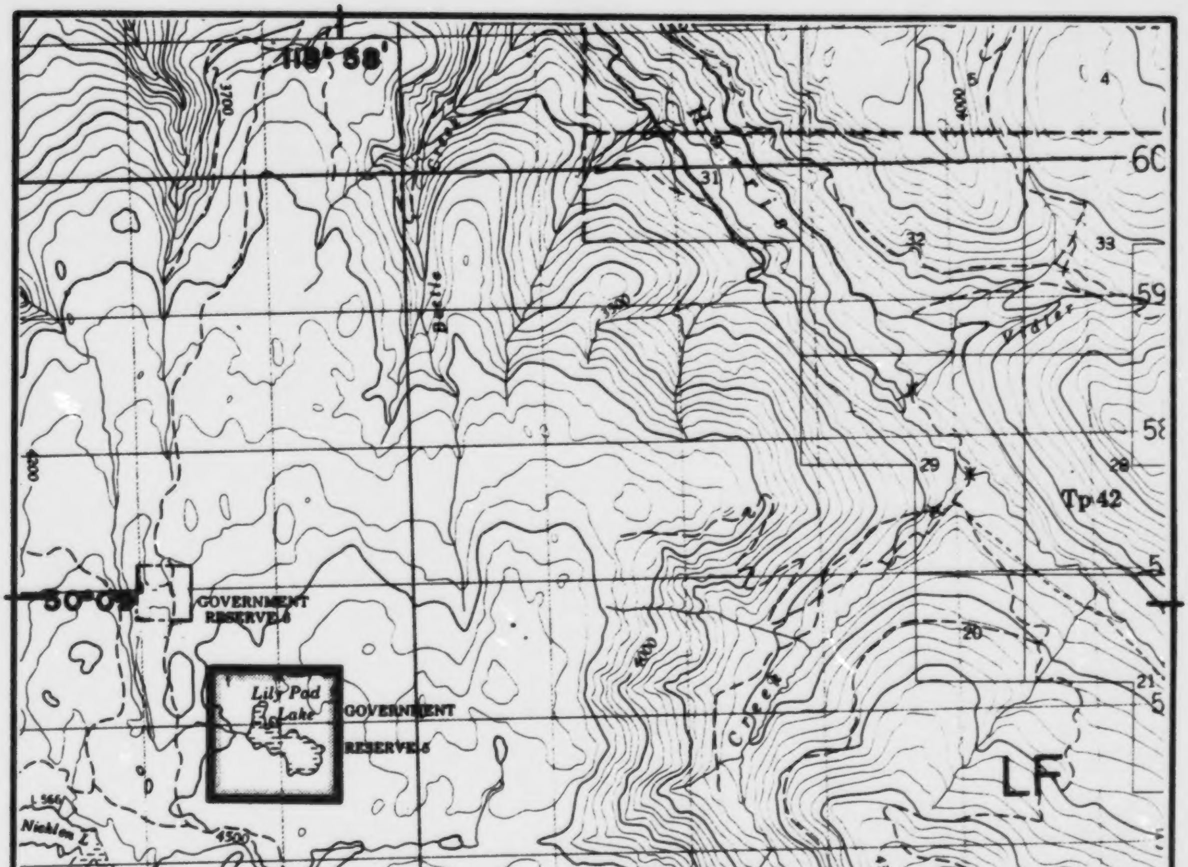
In the open forest, red-shafted flicker, yellow-bellied sapsucker, calliope hummingbird, tree swallow, and red-breasted nuthatch have been seen. Yellow-bellied marmots, northern pocket gophers, black bears, lynx, and moose are found in the reserve.

The lake is home to beaver, muskrat, common loon, toads, frogs and salamanders. Spotted sandpiper, American dipper, and eastern kingbird nest at the edge of the lake.

OTHER FEATURES: The lake is an excellent example of a small, slightly acidic bog lake undergoing natural eutrophication. Some damming by beaver has resulted in tree kill at the margin of the lake. Adjacent lands outside the reserve have been logged for pine beetle control.

OTHER INFORMATION: Order-in-Council no. 1567, 4 May 1971. Application no. 37. Map no. 82 L/2. Reports available on limnology, wildlife and vegetation, and management of surrounding pine beetle-infested forests. There has been some disturbance of native vegetation caused by livestock grazing. Access via Aberdeen and Goat Mountain Lake logging roads from Lavington to Nicklen Lake.

2-5B


118° 58'
3700
60
31
32
33
4
4000
59
58
29
28
Tp 42
50° 05'
GOVERNMENT RESERVE 8
Lily Pad Lake
GOVERNMENT RESERVE 8
20
21
5
Creek
LF
4500
Nicklen L.
58
59
60
61
62
63
64
65
Goat Mountain Lake
4100
5000
Heart
Ditch
0
1
2
3
4 km

SCALE 1:50000

N.T.S. No. 82 L/2

ECOLOGICAL RESERVE No. 5
LILY PAD LAKE

BUCK HILLS ROAD

E.R. #6

PURPOSE: To conserve a small stand of western larch which includes large, old specimens

LOCATION: 11 km S of Lumby; 1.5 km NNE of Nicklen Lake

SIZE: 16 ha LAT: 50°09'N LONG: 118°59'W ELEVATION: 1310 - 1340 m

BIOGEOCLIMATIC ZONE: Montane Spruce

PHYSICAL FEATURES:

The reserve is located on the Okanagan Highland, an upland between the Thompson Plateau and Monashee Mountains. The undulating plateau surface is widely mantled with glacial drift. Piles of large, weathered granitic boulders, uncommon in surrounding terrain, are a feature of the reserve, which slopes gently to the north. A shallow seepage gulley extends through the reserve in a north-south direction.

BIOTIC FEATURES:

The major feature is a stand of western larch, including all ages from seedlings to large mature trees. Most of the latter are associated with boulder piles in the western half of the reserve. The boulder landscape may have protected these trees from fire, allowing mature stands to develop. Other trees here include lodgepole pine, Engelmann spruce, western hemlock, subalpine fir, trembling aspen, and black cottonwood. Common understory shrubs in the larch woods are Saskatoon, soopolallie, grouseberry, black huckleberry, black gooseberry, and black twinberry. Typical herbaceous species are pinegrass, bluejoint, bunchberry, wild strawberry, sweet-scented bedstraw, northern gentian, and rosy pussytoes. Common wildflowers include fairy-slipper orchid, early blue violet, and mountain arnica.

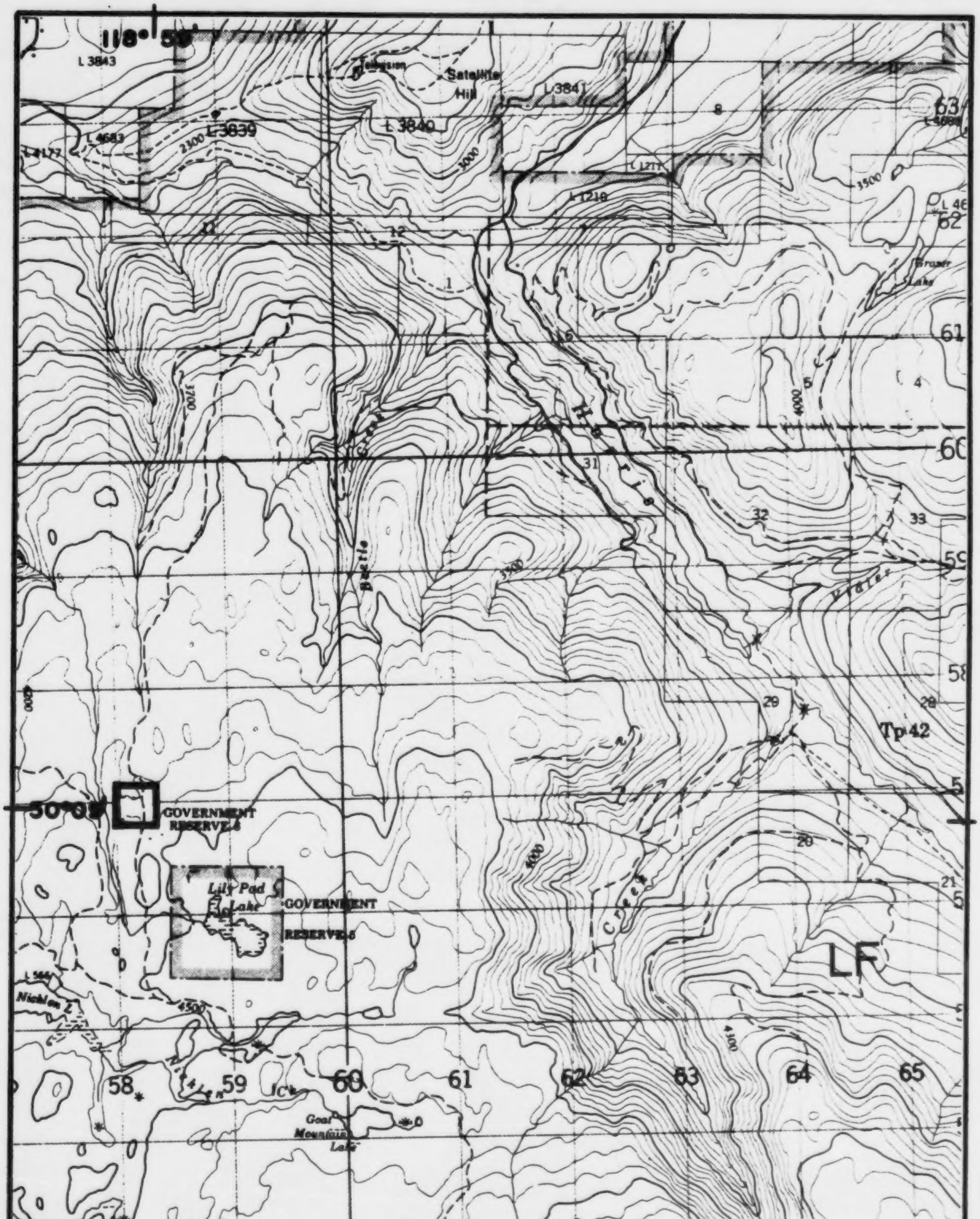
Numerous species of birds have been noted, of which the great-horned owl, saw-whet owl, red-shafted flicker, and red-breasted nuthatch are reported to nest in the larch trees. The abundance of pikas here is of interest, since this population is well removed from the usual habitat of this species - talus slopes in alpine areas. The boulder piles also provide habitat for the northern alligator lizard, otherwise of sparse occurrence in continuously forested habitat. Squirrels and chipmunks are common.

OUTSTANDING FEATURES: Mature western larch stands; unusual occurrence of pika; abundance of northern alligator lizards.

OTHER INFORMATION: Order-in-Council no. 1568, 4 May 1971, and 1372, 2 August 1984 (boundary revision). Application no. 39. Map no. 82 L/2.

Livestock grazing occurs here. Access via Goat Mountain Lake Forest Access Road to within 1 km of reserve. An old road passes through the reserve.

One report is available on wildlife and vegetation.


118° 59'
L 3843
Television
Satellite Hill
L 3841
L 4683
L 3839
L 3840
L 4177
2300
3000
8
63
3500
L 1217
L 1218
L 46
62
Fraser Lake
11
12
1
6
61
5
4
4000
3700
Harris
60
31
32
33
Beetle
Creek
3500
59
Vidler
58
29
28
Tp 42
5
50°05'
GOVERNMENT RESERVE 6
Lily Pad Lake
GOVERNMENT RESERVE 6
4000
20
21
Creek
LF
Nicklen
4500
4100
58
59
60
61
62
63
64
65
Goat Mountain Lake

SCALE 1:50 000

1 0 1 2 3 4 km

N.T.S. No. 82 L/2

ECOLOGICAL RESERVE No. 6
BUCK HILLS ROAD

TROUT CREEK

E.R. #7

PURPOSE: To conserve representative semi-arid vegetation dominated by ponderosa pine and Douglas fir in the southern interior of B.C.

LOCATION: 5 km SSW of Summerland, N of Trout Creek on south slopes of Mt. Conkle

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SIZE: 75 ha LAT: 49°33'N LONG: 119°42'W ELEVATION: 540 - 850 m

BIOGEOCLIMATIC ZONES: Ponderosa Pine; Interior Douglas Fir

PHYSICAL FEATURES:

The deep narrow Trout Creek canyon borders the west and south sides of this reserve. The reserve comprises nearly flat benches with lacustrine soils cut by small gullies, as well as several hills with shallower rocky soils. Slope exposure is largely to the south and southwest.

BIOTIC FEATURES:

Ponderosa pine dominates three of the four plant communities reported. In decending order of frequency, they are: ponderosa pine - bluebunch wheatgrass with occasional rabbitbrush on terraces and slopes; ponderosa pine - Douglas fir - Saskatoon on talus slopes; and a small amount of ponderosa pine - Douglas fir - pinegrass. Wallace's selaginella characterizes a community of scattered herbs on rocky outcrops. Junipers are also common.

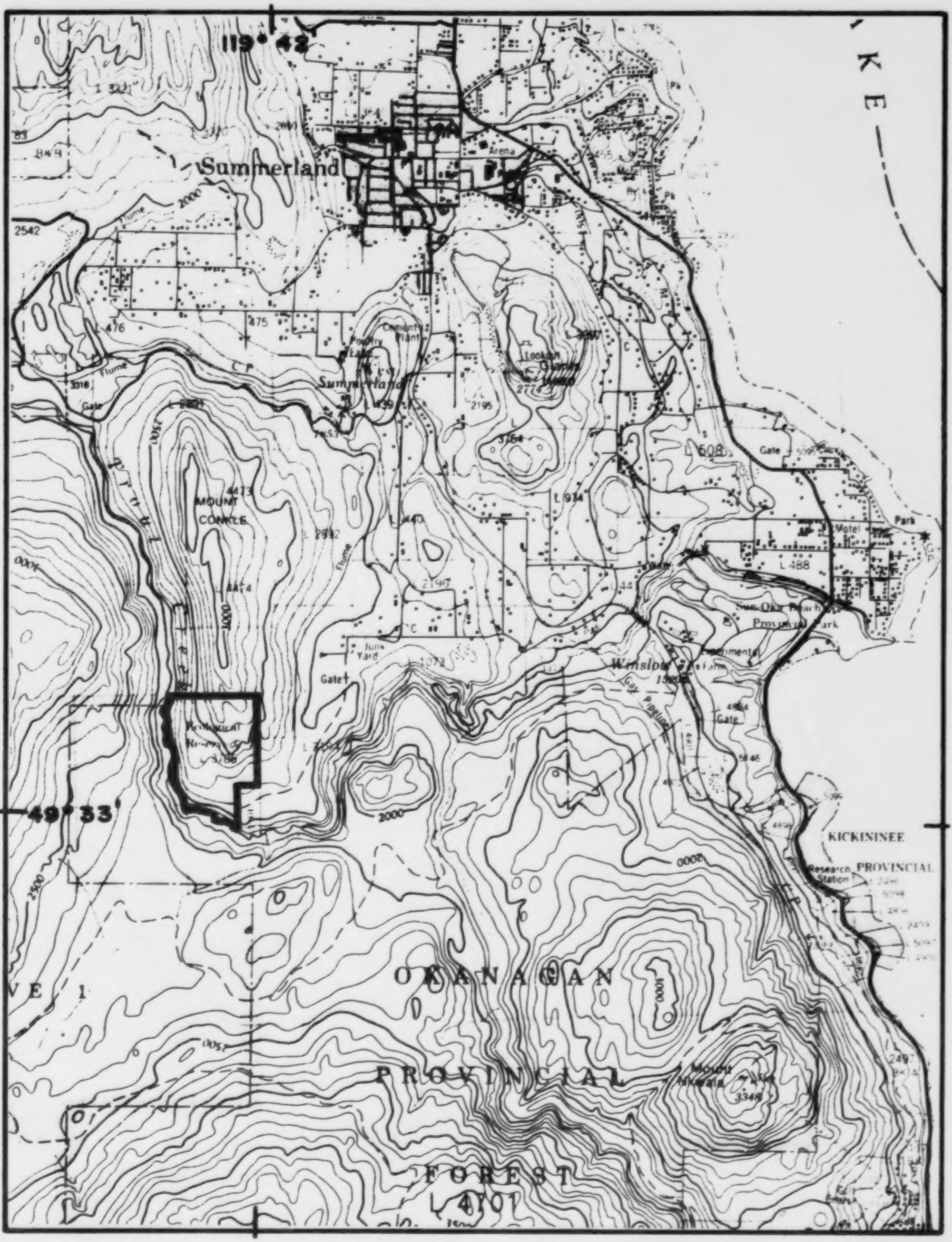
Some of the interesting dryland plants are prickly-pear cactus, bitter-root, false yarrow and the rare Columbia goldenweed (Haplopappus carthamoides subsp. carthamoides), scarlet skyrocket (Ipomopsis aggregata), and prickly phlox (Leptodactylon pungens).

Poor-will, white-throated swift, calliope hummingbird and the Townsend's solitaire nest here while interesting sightings include golden eagles, great horned owl, Say's phoebe and the black-billed magpie. A variety of other dry forest birds is present. Common mammals include mule deer, coyotes, yellow-bellied marmots, and chipmunks.

The wandering garter snake, common garter snake, western yellow-bellied racer, Rocky Mountain rubber boa, bull snake and Northern Pacific rattlesnake are found in this semi-arid parkland of ponderosa pine and Douglas fir, ranking it as an important site in terms of reptile diversity.

OTHER INFORMATION: Order-in-Council no. 1569, 4 May 1971. Application no. 18. Map no. 82 E/12E. One M.Sc. thesis on vegetation and two reports on snakes and fencing are available. Knapweed has spread along old roads in the reserve. Other disturbance is by past cattle grazing and erosion of steep road grades. Access can be had by road from Summerland.

2-7B


119° 42'
49° 33'
KE
Summerland
Arena
Flume
2000
2542
L 476
L 475
Cement Plant
Poultry Farm
Summerland
Lookout
Giants Head
2774
3764
L 608
L 914
Gate
Motel
Park
L 488
Sun-Oka Beach Provincial Park
Experimental Farm
Winslow
Gas Pipeline
MOUNT CONKLE
4473
4474
Flume
Gate
Ecological Reserve
3786
2000
3000
KICKININEE
PROVINCIAL
Research Station
OKANAGAN
PROVINCIAL
FOREST
Mount Nkwala
3348
L 4701
2500
1
0
1
2
3
4 km

SCALE 1:50 000

N.T.S. No. 82E/12

ECOLOGICAL RESERVE No. 7
TROUT CREEK

CLAYHURST

E.R. #8

PURPOSE: To conserve grassland and aspen grove communities on rugged slopes along the Peace River

LOCATION: 4 km S of Clayhurst, 32 km E of Baldonnel, at Alberta border

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SIZE: 316 ha LAT: 56°08'N LONG: 120°02'W ELEVATION: 390 - 625 m

BIOGEOCLIMATIC ZONE: Boreal White and Black Spruce

PHYSICAL FEATURES:

The reserve primarily encloses south-facing breaks along the north bank of the Peace River. Small areas of plateau surface and alluvial floodplain are also present, as well as a short segment of the Peace River and steep banks on its south side. Over most of the area sandstone and shale bedrock of the Dunvegan Formation is overlain by colluvial material such as slopewash and slide debris. Two small streams dissect the area and have formed small alluvial fans. Alluvial action of the Peace River has been modified by upstream flow control which has eliminated the spring flood and reduced winter ice cover.

BIOTIC FEATURES:

A mosaic of aspen forest, aspen parkland, shrubland, grassy slopes, eroded banks, floodplain cottonwood stands, and sandbars is present. Aspen forest covers much of the area, especially the plateau surface and valley of the westernmost creek. Grassy slopes support wheatgrasses, needlegrasses, and a variety of forbs. Common upland shrubs are Saskatoon, prickly rose, and snowberry. Alluvial cottonwood stands have an understory dominated by various willows, red-osier dogwood, and water birch.

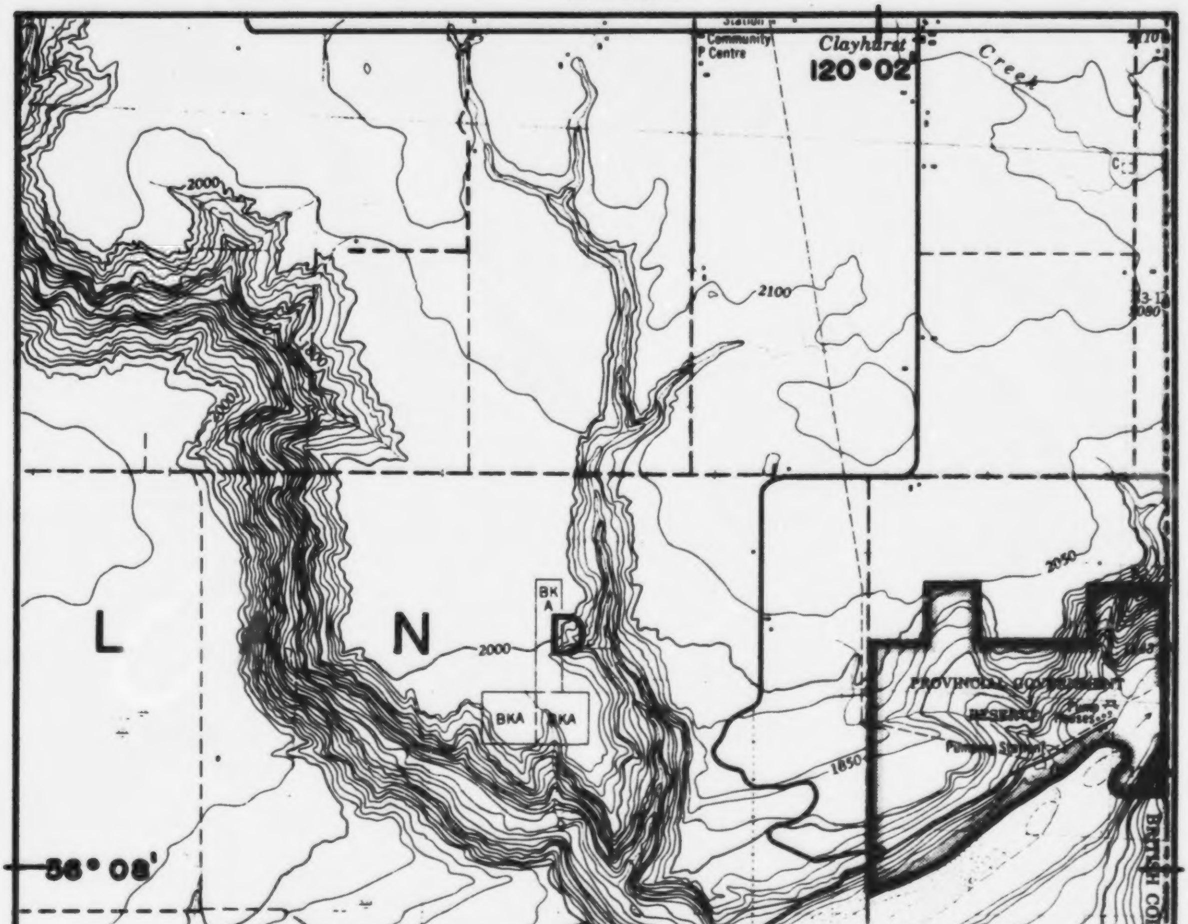
Two very rare plants, long-leaved mugwort (Artemisia longifolia) and slender muhlenbergia (Muhlenbergia filiformis) have been collected in the reserve. These are Great Plains species which enter British Columbia only in the Peace River Parklands. Several other plants of similar distribution and rarity should also occur.

As in the case of plants, some eastern birds range into the province only in this area. Among those noted to date are the blue jay, Canada warbler, northern Oriole, and rose-breasted grosbeak. Waterfowl and shorebirds migrate through the valley and stop on sandbars and beaches. The American kestrel, ruffed grouse, least flycatcher, yellow warbler, and Brewer's blackbird are known to nest in the reserve. The valley slopes provide excellent winter range for deer.

OUTSTANDING FEATURES: Aspen parkland habitat supporting peripheral flora and fauna characteristic of the Great Plains but rare in British Columbia.

OTHER INFORMATION: Order-in-Council no. 1570, 4 May 1971. Application no. 35. Map no. 94 A/1. Accessible by road from Clayhurst. A water pumping station and electrical lines to it are located in the reserve. Cattle grazing has been noted.

2-8B


Station
Community Centre
Clayhurst
120°02'
Creek
2000
2100
2050
L
A
N
D
BK A
BKA
BKA
PROVINCIAL GOVERNMENT RESERVE
Pump Houses
Pumping Station
1850
56°08'
Ferry
1750
1500
ISLAND 2
BRITISH COLUMBIA
Mile 160
BKA
0
1
2
3
4 km

SCALE 1:50000

N.T.S. No. 94 A/1

ECOLOGICAL RESERVE No. 8
CLAYHURST

TOW HILL

E.R. #9

PURPOSE: To reserve a sand beach, dune ecosystems, and inland moor bogs on the Queen Charlotte Lowland

LOCATION: 22 km E of Massett, northeastern Graham Island

SIZE: 514 ha LAT: 54°03'N LONG: 131°50'W ELEVATION: 0 - 30 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

A broad beach of hard sand is present, partly the result of the presence of Yakan Point which acts as a natural groin and traps sand being moved northeastward by littoral drift. This is a segment of the longest, most spectacular beach in the province. Its 200 m wide foreshore slopes gently into Dixon Entrance, while the backshore is characterized by a series of dunes and ancient beach forms to 10 m above present sea level. Low-lying boglands occupy most of the inland part of the reserve, and contain several ponds and a meandering stream.

BIOTIC FEATURES:

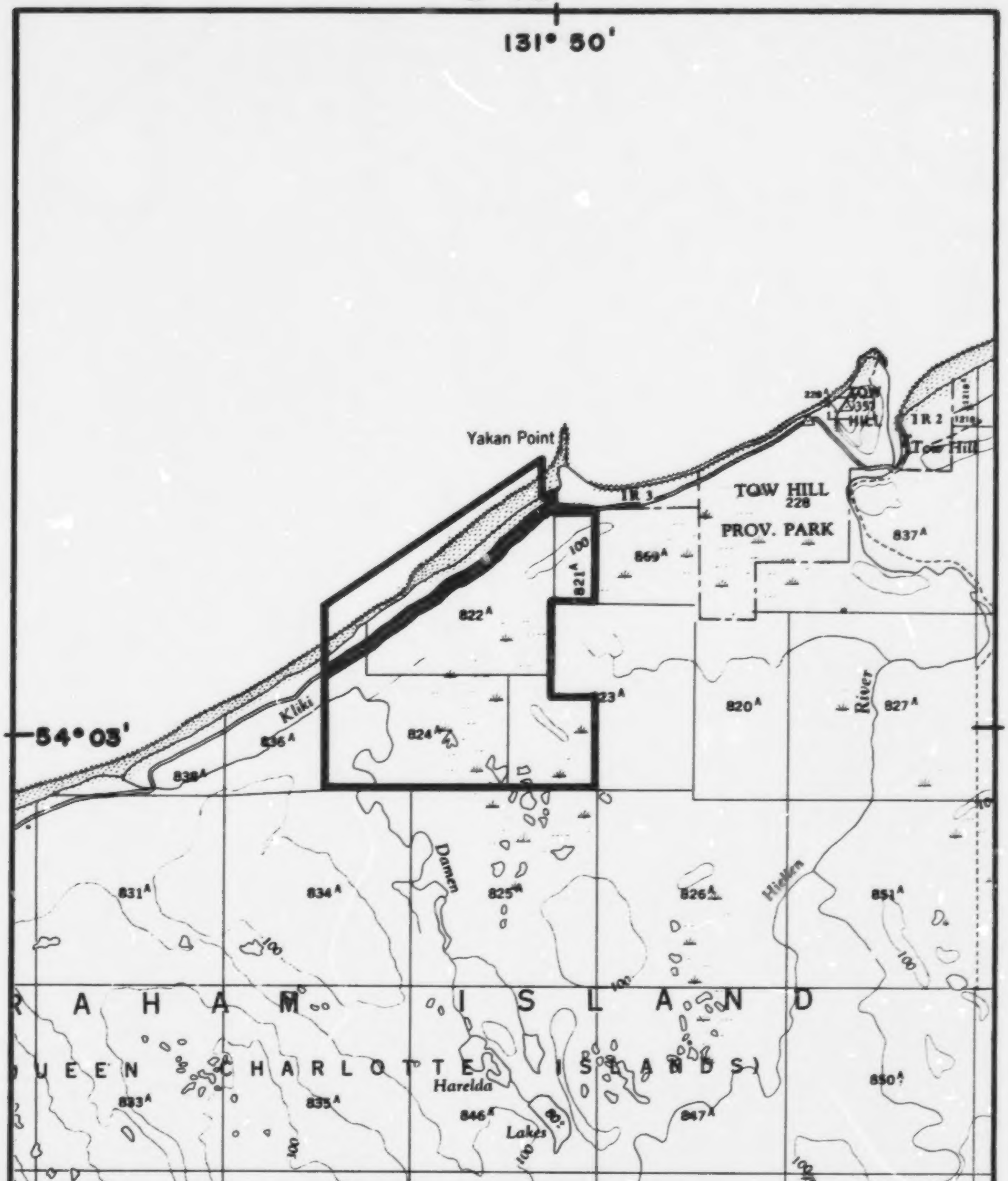
Plant communities associated with dunes, coniferous forest, and bogs characterize the reserve. Sand-binding grasses and herbs grow in patches on the dunes, including several species that are rare in the province. These are the big-headed sedge (*Carex macrocephala*), American glehnia (*Glehnia littoralis* subsp. *leiocarpa*), western dune daisy (*Tanacetum bipinnatum* subsp. *huronense*) and sea mertensia (*Mertensia maritima*). In British Columbia, the sea mertensia is known to occur only in the Queen Charlotte Islands. In the lee of the beach and sand dunes, Sitka spruce and to a lesser extent western hemlock and western redcedar grow as closed coniferous forest. Further inland, level terrain with impeded drainage has created large open bogs containing much peat moss and many bonsai-like shore (lodgepole) pine. Ten species of peat moss and 12 of reindeer moss (lichens of the *Cladonia* group) have been recognized on one brief visit to the bogs.

No data are available on wildlife but species observed in the nearby Rose Spit Reserve (#10), i.e. marten, red squirrel, deer mouse, black-tailed deer, and racoon are probably also found here. Harbour seals and northern sea lions are likely visitors along the coast. A variety of shorebirds is expected during migration periods.

OTHER INFORMATION: Order-in-Council no. 1571, 4 May 1971. Application no. 26. Map no. 103 J/4. A report describing plant communities in the reserve has been prepared.

Access is available by dirt road from Massett. This road passes completely across the reserve. The reserve is bounded on the west, east, and south by Naikoon Provincial Park.

2-9B


131° 50'
54° 03'
Yakan Point
TOW HILL
228
PROV. PARK
TOW HILL
I R 3
I R 2
Tow Hill
Kliki
River
Hiellen
Damon
Harelda
Lakes
GRAHAM ISLAND
(QUEEN CHARLOTTE ISLANDS)
100
821A
822A
823A
824A
836A
838A
869A
837A
820A
827A
831A
834A
825A
826A
851A
833A
835A
846A
847A
850A
843A
844A
845A
848A
849A
1
0
1
2
3
4 km

SCALE 1:50 000

N.T.S. No. 103 J/4

ECOLOGICAL RESERVE No. 9
TOW HILL

ROSE SPIT E.R. #10

PURPOSE: To conserve a sandy coastal marine environment and the associated flora and fauna

LOCATION: Northeast point of Graham Island, Queen Charlotte Islands, 35 km NE of Massett

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SIZE: 170 ha LAT: 54°10'N LONG: 131°40'W ELEVATION: 0 - 40 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

This unique spit, the largest of its kind in British Columbia, has been created by sand and gravel deposited by prevailing southeast winter winds and wave action in Hecate Strait. Large dunes were formed which unless stabilized, move inland from the Hecate Strait side of the point. These are up to 10 m high. Masses of driftwood accumulate at the high tide line bordering the dunes. Lands inland from the dunes are flat and low-lying.

BIOTIC FEATURES:

Driftwood communities, dunes, meadows, and forest constitute the four major habitats in the reserve. A seabeach sandwort - sea mertensia - european searocket association pioneers the driftwood zone along the west side of the spit. Exposed sand dune habitat is colonized by seashore bluegrass - western dune daisy - big-headed sedge, and seashore bluegrass - dune wildrye - big-headed sedge associations. In the lee of the forest, dune ridges support a seashore bluegrass - purple horntooth moss - pixy-cup lichen community. Three Sitka spruce forest communities are differentiated respectively by the presence of Oregon beaked-moss, salal, or Pacific reedgrass. Several rare plants which are adapted to sandy substrates occur here.

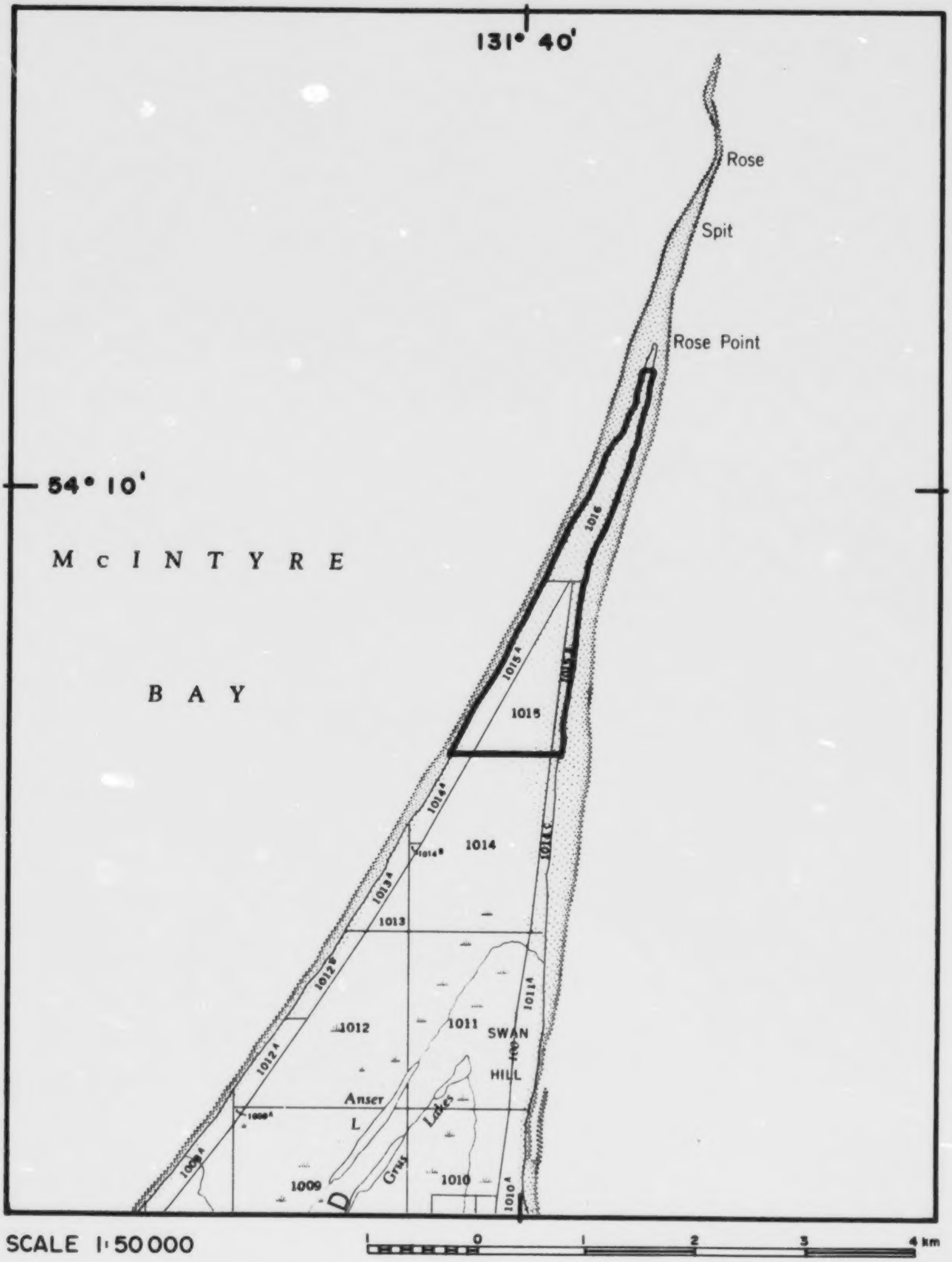
The rich and varied bird fauna includes common, red-throated, and arctic loons, three species of goose, ducks of many kinds, three species of scoters and gulls, and numerous shorebird species. On the upland are found hawks, falcons, bald eagles, crows and many passerines such as sparrows and warblers. The current bird list for the reserve includes 64 species.

The mammals include marten, red squirrel, deer mouse, black-tailed deer and raccoon. Harbour seals are common offshore while northern sea lions are occasional visitors.

OTHER INFORMATION: Order-in-Council no. 1572 and 2028 (amendment), 4 May 1971 and 8 June 1971. Application no. 27. Map no. 103 J/4. Reports available on vegetation, sand dune formation, and management.

All terrain vehicle use has created tracks through this fragile environment and contributed to a sand dune blow-out. However, such damage is now prevented. Naikoon Provincial Park borders the reserve on the south.

2-10B


131° 40'
Rose
Spit
Rose Point
54° 10'
McINTYRE
BAY
1016
1015A
1015B
1015
1014A
1014B
1014
1014C
1013A
1013
1012B
1012
1012A
1011
SWAN
HILL
1011A
Anser
L
Grus
Lakes
1009A
1009
D
1010
1010A
SCALE 1:50 000
1
0
1
2
3
4 km

N.T.S. No. 103 J/4

ECOLOGICAL RESERVE No. 10
ROSE SPIT

SARTINE ISLAND E.R. #11

PURPOSE: To protect colonies of breeding seabirds and their habitat

LOCATION: 33 km WNW of Cape Scott on the Cook Bank, between Beresford and Triangle Islands in the Scott Islands

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SIZE: 13 ha LAT: 50°49'N LONG: 128°54'W ELEVATION: 0 - 105 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

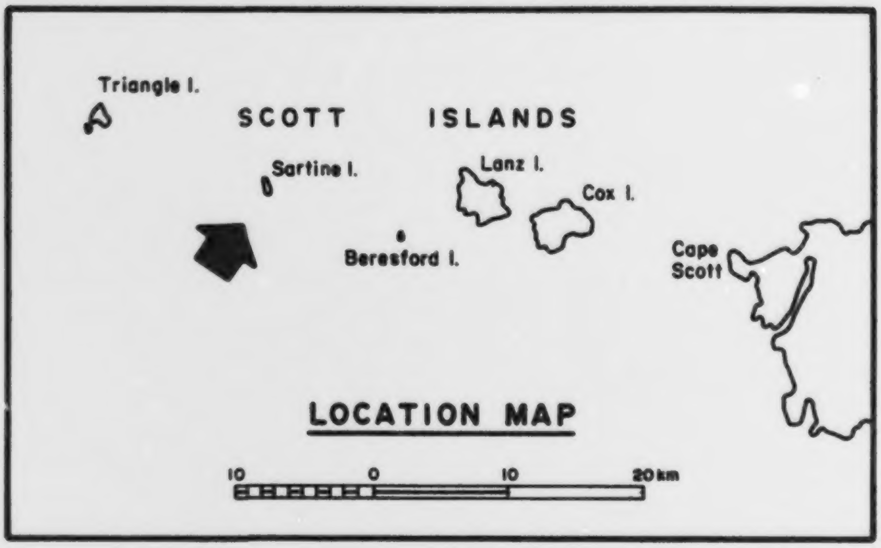
This is a rugged, elongate island which rises steeply from the sea to a series of pinnacles and humps. The shoreline is rock, rising directly from the water, except for a narrow boulder beach along the northeastern shore. Though steep, most of the upper slopes have a deep rich soil favorable for plant growth, and few vertical cliffs are present.

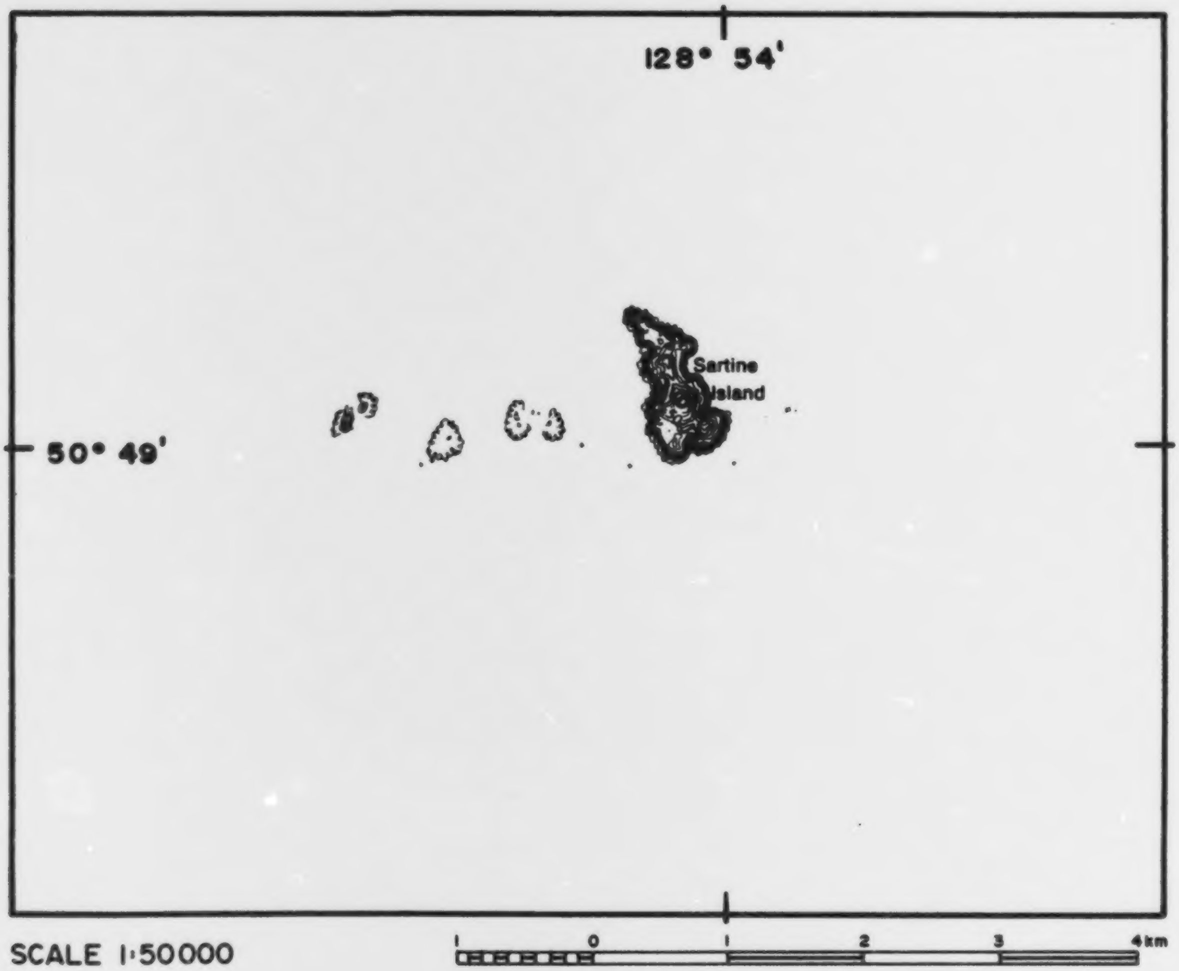
BIOTIC FEATURES:

The island supports no trees, and shrubs are not extensive. Rather luxuriant stands of dune wildrye grass cover many slopes, and salmonberry is present at the summit where the ground is nearly flat in a few places. Interesting plant records include leatherleaf polypody fern, hedge-nettle, Indian paintbrush, western buttercup, and hairy rockcress. Twenty three species of vascular plants have been collected or observed.

Nesting seabirds include Cassin's auklet (numbers unknown), tufted puffin (at least 25 pairs), common murre (130 pairs), glaucous-winged gull (200 pairs), pelagic cormorant (50 pairs), and Brandt's cormorant (20 pairs). Additional cormorants, gulls and murres nest on rocks just outside the reserve. The Brandt's cormorant colony, discovered in 1975, may in fact not be a breeding site, since this species is known to build and attend "dummy" nests. Black oystercatchers and pigeon guillemots nest around the shoreline. Fox and song sparrows are the most common land birds. A pair of peregrine falcons nest here; bald eagles have been seen in summer and may nest as well. The only land mammal is a large, endemic sub-species of the deer mouse (*Peromyscus maniculatus sartinensis*). Harbour seals are common around the shoreline. Rocks just outside the reserve provide a summer rookery for 800 - 1200 Steller sea lions. Three species of isopods, 1 millipede, and 2 land snails have been collected on Sartine.

OTHER INFORMATION: Order-in-Council no. 1573, 4 May, 1971. Application no. 13. Map no. 102 I/15. Marine Chart no. 3625. Accessible by boat, but landing is difficult. Closed to the public by Order-in-Council (no. 1920, 16 June 1977) to protect nesting birds and their habitat. A permit is required to land on the island. Brief reports on seabird occurrence and abundance are available.


Triangle I.
SCOTT ISLANDS
Sartine I.
Lanz I.
Cox I.
Beresford I.
Cape Scott
LOCATION MAP
10
0
10
20 km


128° 54'
50° 49'
Sartine Island
1
0
1
2
3
4 km

SCALE 1:50000

N.T.S. No. 102 I/15

ECOLOGICAL RESERVE No. 11
SARTINE ISLAND

BERESFORD ISLAND

E.R. #12

PURPOSE: To protect colonies of nesting seabirds and their habitat

LOCATION: 23 km W of Cape Scott on the Cook Bank, between Lanz and Sartine Islands in the Scott Group

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SIZE: 7.7 ha LAT: 50°47'N LONG: 128°46'W ELEVATION: 0 - 100 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

A small, rocky island, roughly oval in shape, which rises steeply from deep water to a rounded top. The shore is rock and the upper slopes tend to have less soil cover than Triangle and Sartine Islands. A number of rocks and reefs occur in close proximity to the main island.

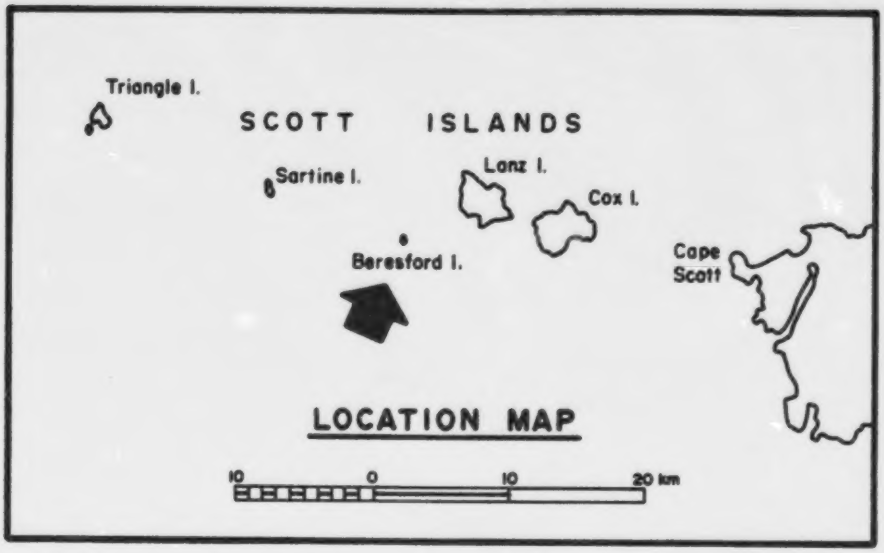
BIOTIC FEATURES:

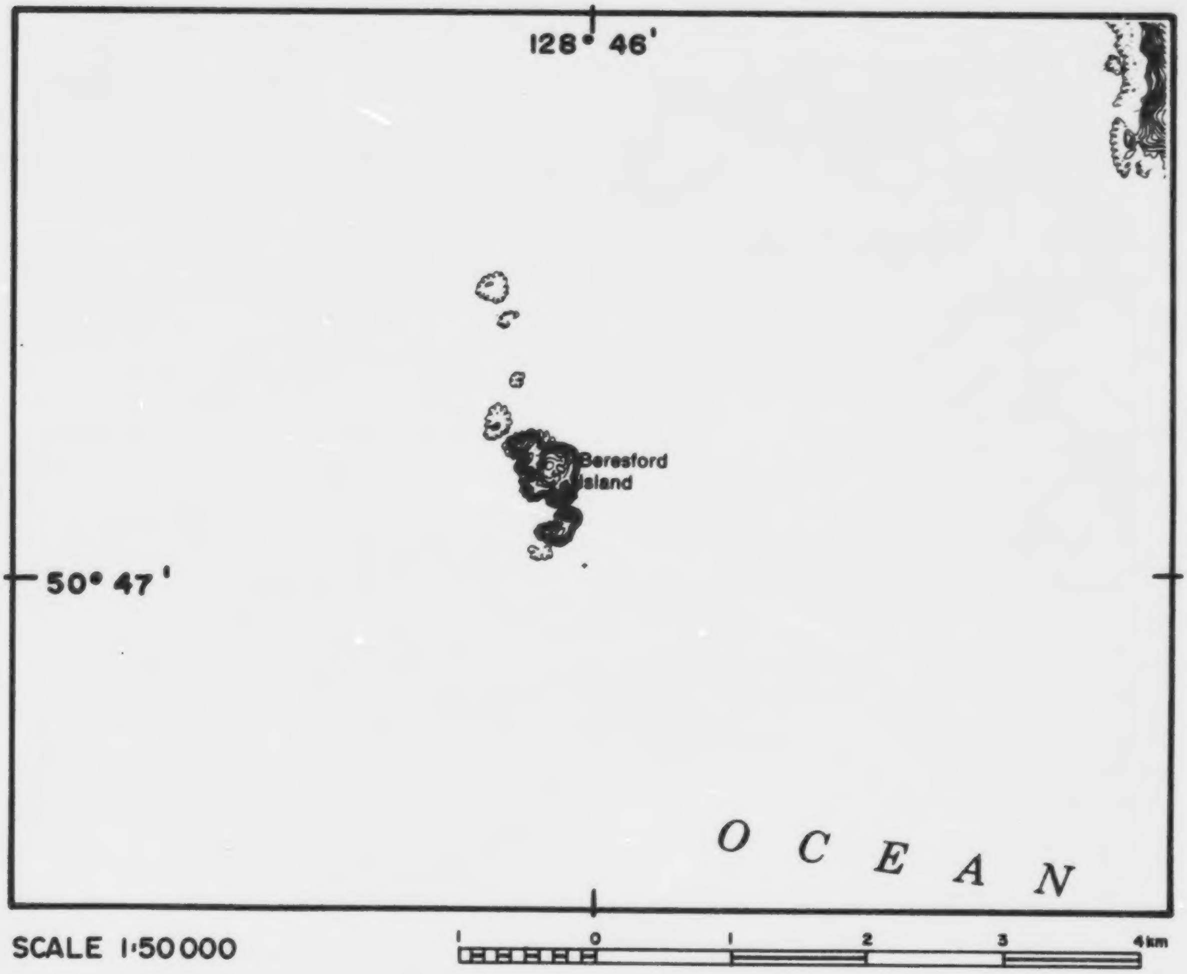
Of the three outermost islands in the Scott group, this is the only one which supports trees. These are Sitka spruce, very old and much battered by the elements, growing on the rounded summit of the island. Red elderberry and black twinberry, confined largely to the summit, are the dominant shrubs, and tufted hairgrass is the most widespread herb. Interesting rare plants of the rocky slopes are hairy goldfields (Lasthenia minor subsp. maritima) growing in crevices just above the surf, and northern Pacific whitlow-grass (Draba hyperborea) somewhat higher up. Twenty five species of vascular plants have been recorded.

Nesting seabirds include two burrowing alcids (Cassin's auklet and tufted puffin), the glaucous-winged gull, and pelagic cormorant. Surveys of their abundance have not been carried out. Single pairs of nesting bald eagles and peregrine falcons are known. Fox and song sparrows are abundant in summer and presumably nest on the island. The only land mammal present is a large-bodied endemic race of the deer mouse (Peromyscus maniculatus beresfordi). Steller sea lions use Beresford and adjacent rocks as a breeding rookery. In recent years 600 - 800 sea lions have been present in summer; about 100 in winter. Up to 6,000 sea lions bred at Beresford in the early part of this century but numbers were reduced by shooting of over 12,000 animals between 1913 and 1966.

OTHER INFORMATION: Order-in-Council no. 1574, 4 May, 1971. Application no. 13. Map no. 102 I/15. Marine Chart no. 3625. Accessible by boat, but landing is difficult. Closed to the public by Order-in-Council (no. 1920, 16 June 1977) to protect nesting birds and their habitat. A permit is required to land on the island. More detailed biological inventory is needed.

2-12 B


Triangle I.
SCOTT ISLANDS
Sartine I.
Lanz I.
Cox I.
Beresford I.
Cape Scott
LOCATION MAP
10
0
10
20 km


128° 46'
Beresford Island
50° 47'
OCEAN
1
0
1
2
3
4km

SCALE 1:50000

N.T.S. No. 102 I/15

ECOLOGICAL RESERVE No. 12
BERESFORD ISLAND

ANNE VALLEE (TRIANGLE ISLAND) E.R. #13

PURPOSE: To protect large colonies of breeding seabirds, other nesting birds, endemic mammals and their habitat on one of B.C.'s most remote islands

LOCATION: 45 km WNW of Cape Scott, off northern tip of Vancouver Island

---

SIZE: 85 ha LAT: 50°52'N LONG: 129°05'W ELEVATION: 0 - 210 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

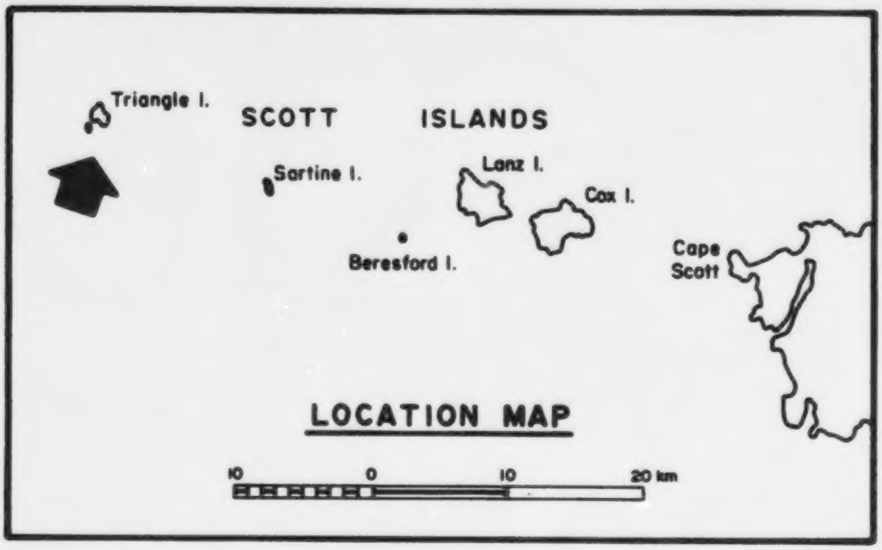
PHYSICAL FEATURES:

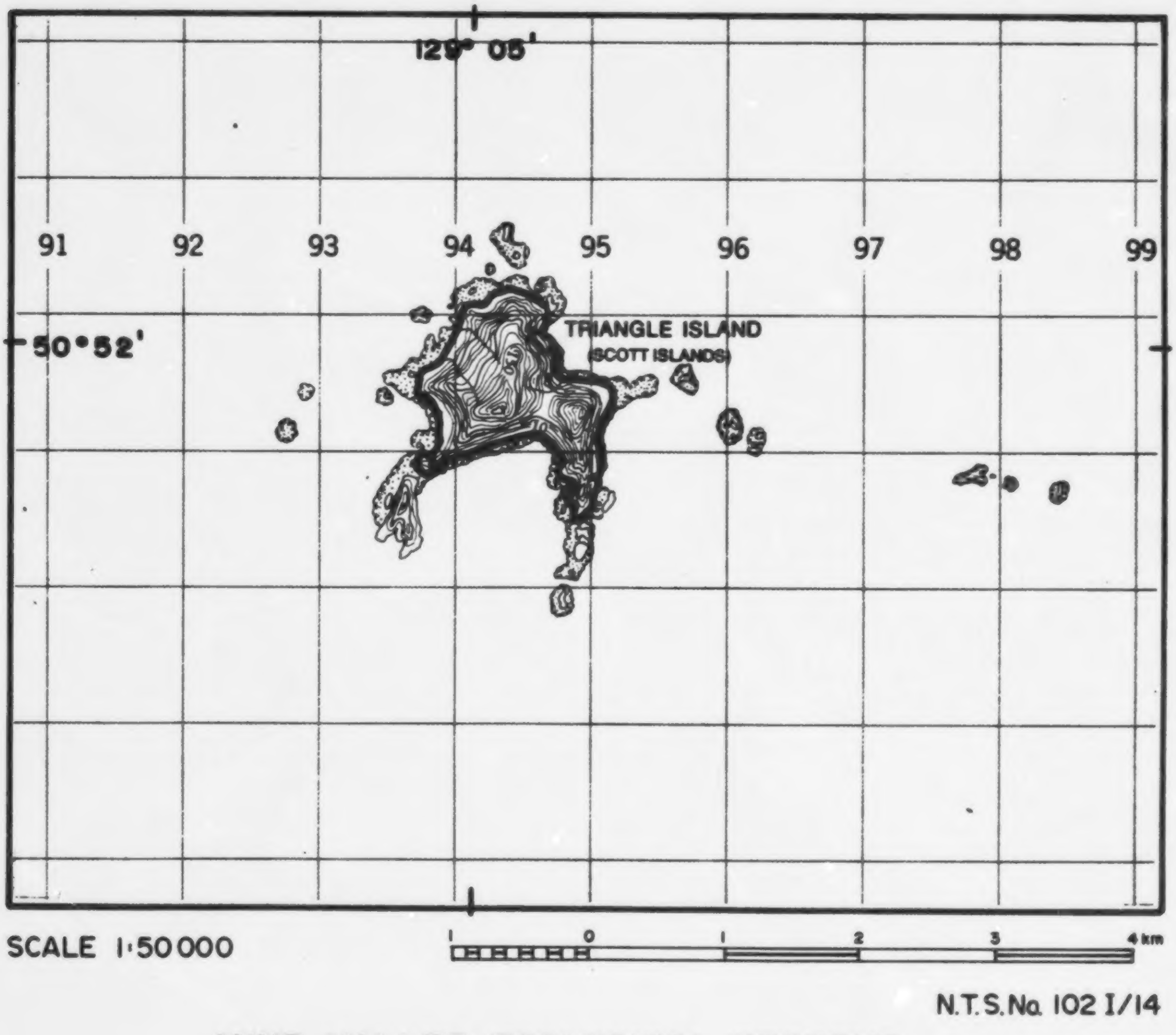
This is a rugged, triangular-shaped island with associated offshore islets and reefs, situated on the Cook Bank. The island has steep outer slopes, and an undulating central plateau. Soils are generally well developed, except on the steepest cliffs, but those on the slopes have a high content of small stones.

BIOTIC FEATURES:

The moist, humid climate and abundance of bird droppings promote a dense plant cover over most of the island. Trees are absent. Vegetation and soils are influenced by ocean spray. A mantle of salmonberry, wind-pruned to a height of 0.5-2.0 m, is the most conspicuous vegetation feature, especially on the central upland. Plants commonly associated with the salmonberry are Pacific crabapple, tufted hairgrass, and salal. Lady ferns, which normally grow under a forest canopy, form large patches among the salmonberry while tufted hairgrass stands dominate the wind-exposed ridges and slopes. Salal forms dense stands on a few soil-covered rocky promontories. On the high central ridges, communities dominated by Alaska saxifrage, in association with Alaska brome, licorice fern, spiny wood fern, and lady fern, also occur. Over 100 vascular plants have been identified here. Most are normally associated with the coast forest, but species with affinities for shorelines and northern bogs are present. At least eight kinds of introduced, weedy plants have been recorded.

In recent years Triangle Island has supported over 400,000 breeding pairs of colonial seabirds - more than any other island on the B.C. coast. These include four burrow-nesting species of the Family Alcidae (Cassin's auklet, tufted puffin, rhinoceros auklet, pigeon guillemot) and two cliff-nesters (common and thick-billed murres). A Cassin's auket colony of 360,000 pairs, the largest in the world and containing 40% of the world population, is spread over most of the island. Preferred nesting habitat is open and short vegetation on a variety of slopes; dense salmonberry stands and rhinoceros auklet colonies are avoided. The largest tufted puffin colony on the Pacific Coast south of Alaska, made up of 25,000 pairs, is largely restricted to grassy slopes on the southeast and southwest peninsulas. About 15,000 pairs of rhinoceros auklets prefer the southeastern slopes for nesting. Pigeon guillemots nest in burrows or among broken rock near the shoreline. About 100 pairs occur. Cliff ledges on


Triangle I.
SCOTT ISLANDS
Sartine I.
Lanz I.
Cox I.
Beresford I.
Cape Scott
LOCATION MAP
10
0
10
20 km


129° 05'
91
92
93
94
95
96
97
98
99
50°52'
TRIANGLE ISLAND
(SCOTT ISLANDS)

SCALE 1:50000

N.T.S.No. 102 I/14

ANNE VALLEE ECOLOGICAL RESERVE
No. 13 (TRIANGLE ISLAND)

several rocky peninsulas, islets, and headlands of the main island are nesting sites for about 3000 pairs of common murres. This is the largest of four B.C. colonies. Recently, 20 or more pairs of thick-billed murres were discovered nesting in the common murre colony, this being the first breeding record for the former species in B.C. Other surface-nesting aquatic birds include the pelagic cormorant (75 pairs), glaucous-winged gull (200 pairs), and black oystercatcher (a few pairs). Additional unique avian features include several nesting pairs of the rare Peale's peregrine falcon, and the only known ground-nesting bald eagles in B.C. Northwestern crows, fox sparrows, and song sparrows nest commonly in the shrubbery and many more land and oceanic birds visit seasonally. Eighty one bird species have been recorded on the island and adjacent waters.

The only native land mammals present are large-bodied endemic races of the deer mouse Peromyscus maniculatus triangularis and Townsend vole Microtus townsendi cowani which have evolved in isolation here for several thousand years. Domestic rabbits, probably introduced by former lighthouse keepers, have become feral. The island is one of only four Steller sea lion breeding rookeries in B.C., supporting 600 - 800 animals in the breeding season, and smaller numbers year-round. Harbour seals are also common.

OUTSTANDING FEATURES: The reserve supports an abundance of nesting seabirds that is unique in B.C., unusual nesting raptors, and endemic mammals. It offers excellent opportunities for study of seabird ecology, small mammal evolution, insular biogeography, and climatic influences on vegetation.

OTHER FEATURES: A site just above the southern beach has extensive middens of mussels intermixed with bird, mammal, and fish bones - apparently a result of pre-historic Indian use. Structural remains from the 1909 - 1919 lighthouse era are of historic interest.

OTHER INFORMATION: Order-in-Council no. 1575, 4 May 1971. Application no. 13. Map no. 102 I/14. Marine Chart no. 3625. Accessible by boat or helicopter but closed to the public by Order-in-Council (no. 1920, 16 June 1977) to protect nesting birds and their habitat. A permit is required to land on the island.

The Canadian Wildlife Service has been studying seabirds here since 1974, and several journal papers and unpublished reports are available on Cassin's auklets, rhinoceros auklets, and tufted puffins, as well as an account of the total bird fauna. A few regional reports include accounts of the flora and mammals. Anne Vallee, a graduate student carrying out seabird research died in an accident on the island in 1982.

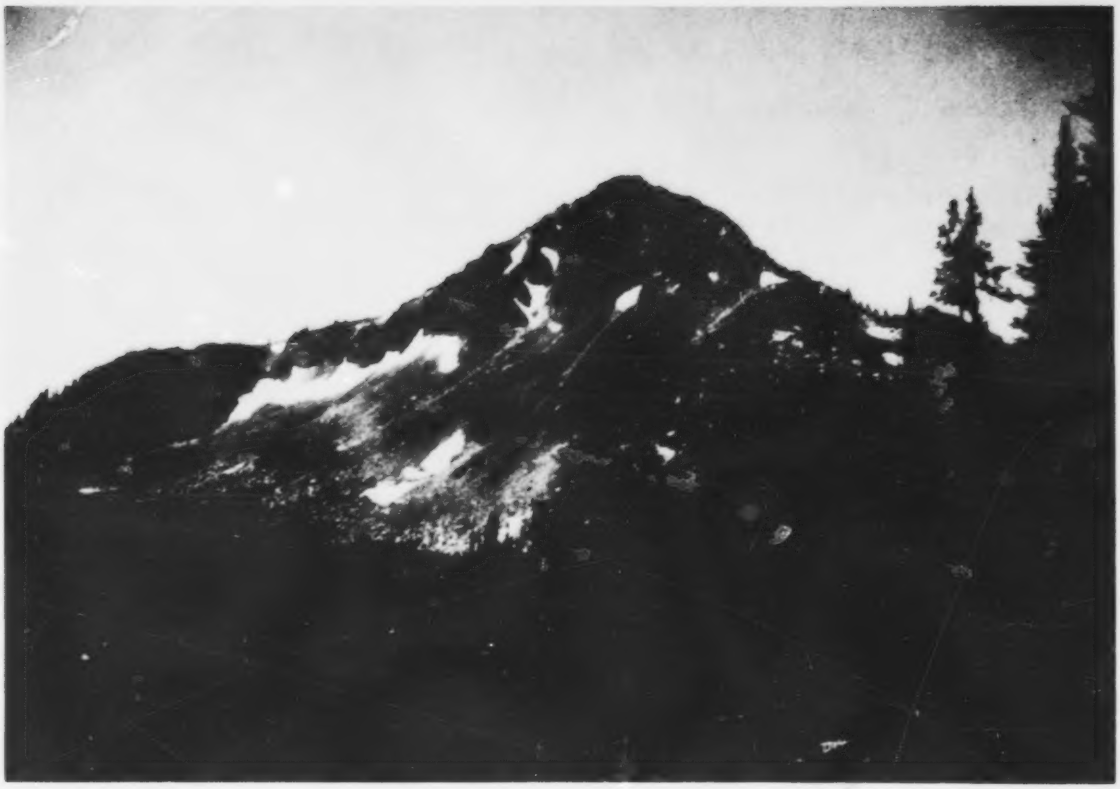


Figure 3. Protection of Representative Ecosystems in the Kingfisher Creek Ecological Reserve (#49)

A major objective of the _Ecological Reserves Act_ is to protect representative examples of natural ecosystems within the province. Many such reserves serve as benchmarks against which man-induced changes in nearby areas can be measured. The Kingfisher Creek Reserve (#49) in the Monashee Mountains protects the subalpine parkland typical of many mountain ranges in British Columbia. (Photo R. Revel)

SOLANDER ISLAND E.R. #14

PURPOSE: To protect large colonies of breeding seabirds and their habitat

LOCATION: 1.5 km W of Brooks Peninsula, northwest coast of Vancouver Island

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SIZE: 7.7 ha LAT: 50°06'N LONG: 127°56'W ELEVATION: 0 - 90 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

The reserve comprises a small, irregularly shaped, steep-sided island with associated offshore rocks and reefs. The frequently indented shoreline consists of rock rising directly from the water. Beaches of cobble or smaller material are absent. Soil cover sufficient for burrow-nesting birds is present on some upper slopes and the summit.

BIOTIC FEATURES:

The vegetation has not been described. Trees are absent. Photographs indicate that shrub growth is limited, although salmonberry is present, and that the most extensive plant cover is grass, probably tufted hairgrass.

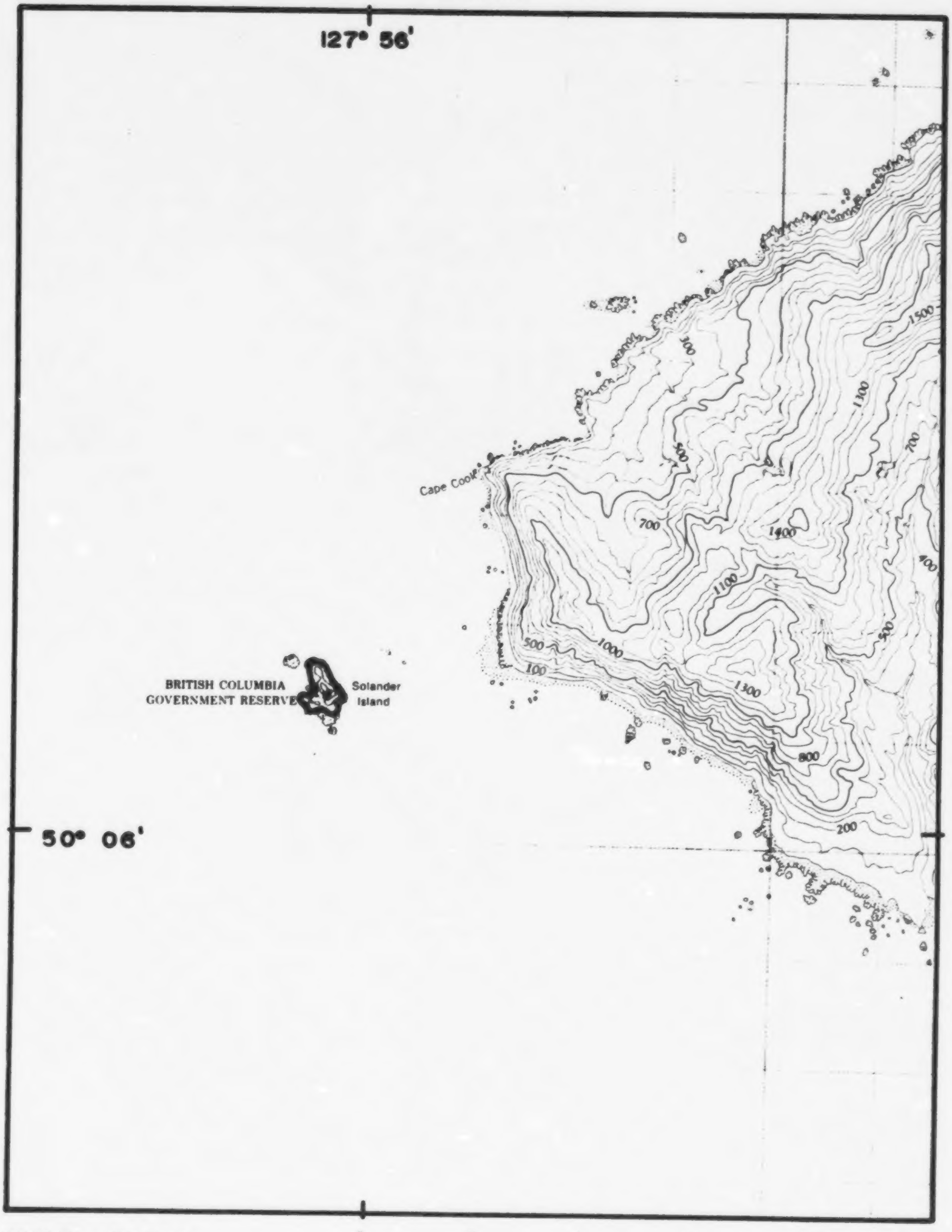
Based on preliminary surveys, burrow-nesting seabirds include the tufted puffin (3000 pairs), Leach's storm petrel (2000 pairs), and Cassin's auklet (1000 or more). Other nesting seabirds are the pelagic cormorant (400 pairs), glaucous-winged gull (300 pairs) and pigeon guillemot (400 pairs). Non-nesting seabirds seen on or near the island include the horned puffin, rhinoceros auklet, common murre, black-legged kittiwake, sooty shearwater, and Brandt's cormorant. Bald eagles and peregrine falcons have been recorded, but nesting is not confirmed. Winter wrens and song sparrows are present in summer and probably nest here.

Land mammals are absent. Prior to the mid-1960's this island was a year-round haul-out site for 100 to 350 Steller sea lions, but not a breeding rookery. Since that time it has been used as a winter haul-out only, by up to 70 Steller and 50 California sea lions.

OUTSTANDING FEATURES: Contains the second largest tufted puffin colony on the B.C. Coast.

OTHER INFORMATION: Order-in-Council no. 1576, 4 May 1971. Application no. 13. Map no. 92 L/4. Marine Chart no. 3680. Accessible by boat, but landing is difficult. Closed to the public by Order-in-Council (no. 1920, 16 June 1977) to protect nesting birds and their habitat. A permit is needed to land on the island. The island is named after Dr. Daniel Charles Solander, a Swedish botanist and pupil of Linnaeus.

2-14B


127° 56'
50° 06'
Cape Cook
BRITISH COLUMBIA
GOVERNMENT RESERVE
Solander
Island
100
200
300
500
700
800
1000
1100
1300
1400
1500
400

SCALE 1:50 000

1 0 1 2 3 4 km

N.T.S. No. 92 L/4

ECOLOGICAL RESERVE No. 14
SOLANDER ISLAND

SATURNA ISLAND

E.R. #15

PURPOSE: Preservation of relatively undisturbed, representative stands of coastal Douglas fir forest and associated fauna

LOCATION: NE of Mt. Warburton Pike, southern ridge of Saturna Island

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SIZE: 131 ha LAT: 48°47'N LONG: 123°10'W ELEVATION: 115 - 325 m

BIOGEOCLIMATIC ZONE: Coastal Douglas Fir

PHYSICAL FEATURES:

Saturna Island consists of two prominent east-west cuestas or ridges separated by a deep valley. The reserve is situated on the summit and north-facing slope of the southern ridge. Bedrock consists of sandstones of the Nanaimo series, scoured by glaciers which moved southeasterly. Soils are mainly Dystric Brunisols (moderately developed, relatively inert, droughty soils) developed on glacial till.

BIOTIC FEATURES:

Though mapped as part of the dry subzone of the Coastal Douglas Fir Zone, the elevation (mostly over 250 m) and aspect (northerly) of this reserve result in forest cover typical of the wet subzone. Garry oak and arbutus are absent. The entire reserve is forested. Semi-mature Douglas firs are the dominant trees, but western hemlock and western redcedar also occur. Salal is by far the predominant shrub, but small amounts of Oregon-grape and baldhip rose are present. Ferns include bracken and sword fern. Common grasses are western and crinkle-awned fescue and blue wildrye; frequent forbs include sweet-scented bedstraw, broad-leaved starflower, and wood strawberry. Of at least 24 species of mosses present, Stokesiella oregana is by far the most common. Three major associations are present, the Douglas fir - salal type being most widespread. Minor amounts of the Douglas fir and/or western hemlock - moss, and Douglas fir - sword fern associations are also present. Stands of red alder, and logged sites with successional fir and hemlock, occupy small areas.

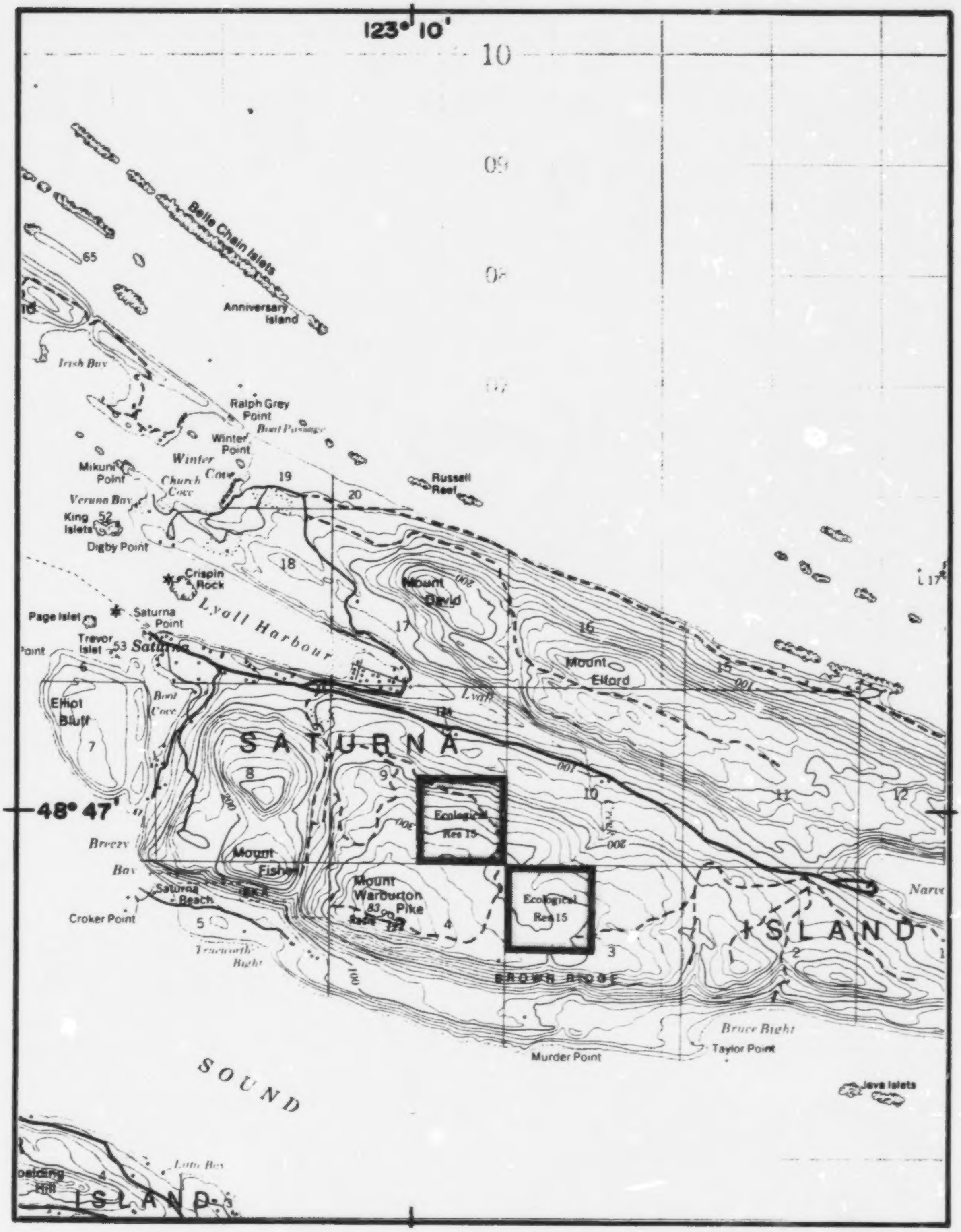
One amphibian, the Pacific tree frog, and one reptile, the northwestern garter snake, have been recorded here. Mammals are limited to the black-tailed deer, red squirrel, deer mouse, wandering shrew, and raccoon. A diversity of forest birds including grouse, woodpeckers, thrushes, chickadees, and warblers is present.

OUTSTANDING FEATURES: This is one of very few relatively mature stands of Douglas fir forest having protected status. It is a potentially important site for long-term studies of forest succession and fire history.

OTHER INFORMATION: Order-in-Council no. 1577, 4 May 1971. Application no. 7. Map no. 92 B/14. The reserve is accessible on foot or by road with truck or 4-wheel drive vehicle. Very small areas near the reserve perimeter have been logged.

An annotated plant list and reports on the vertebrate fauna and on forest ecology are available.

2-15B


123° 10'
48° 47'
Belle Chain Islets
Anniversary Island
Irish Bay
Ralph Grey Point
Boat Passage
Winter Point
Winter Cove
Mikuni Point
Church Cove
Veruna Bay
King Islets
Digby Point
Russell Reef
Crispin Rock
Page Islet
Saturna Point
Trevor Islet
Saturna
Lyall Harbour
Mount David
Mount Elford
Lyall
Boot Cove
Elliot Bluff
SATURNA
ISLAND
Breezy Bay
Mount Fisher
Saturna Beach
Croker Point
Mount Warburton Pike
Ecological Res 15
Ecological Res 15
BROWN RIDGE
Bruce Bight
Taylor Point
Murder Point
Java Islets
SOUND
Little Bay
ISLAND
1 0 1 2 3 4 km

SCALE 1:50000

N.T.S. No. 92 B/14

ECOLOGICAL RESERVE No. 15
SATURNA ISLAND

MOUNT TUAM E.R. #16

PURPOSE: To conserve forest ecosystems representative of the dry subzone of the Coastal Douglas Fir Zone

LOCATION: Southeastern end of Saltspring Island, 4 km S of Fulford Harbour

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SIZE: 254 ha LAT: 48°44'N LONG: 123°28'W ELEVATION: 0 - 420 m

BIOGEOCLIMATIC ZONE: Coastal Douglas Fir

PHYSICAL FEATURES:

The reserve is on the steep, rugged, southeast slope of Mount Tuam, facing Sattelite Channel. These slopes consist of a series of rounded knolls separated by draws. Exposed bedrock is present on the tops of some knolls and along the shoreline, and soils are generally thin. About 1 km of rocky shoreline is included along Sattelite Channel. Freshwater features include a small stream, a pond, and minor swamps. The regionally dry summer climate is accentuated by the reserve's southern exposure and thin soils.

BIOTIC FEATURES:

Second growth Douglas fir forest, with inclusions of arbutus, red alder, and bigleaf maple, covers most of the reserve, although some large veteran firs are present. Pure stands of arbutus, probably the best representation of this species in the ecological reserve system, are found on dry sites around upper elevation bedrock outcrops and near the shoreline. Mosses and grasses cover the rock outcrops. Alder and maple are generally restricted to a few moist draws.

About 160 species of higher plants have been identified to date in the reserve, of which 21 (13%) are rated as rare in the province. Most of these fall into the categories of least concern and while largely limited in distribution to dry sites within the dry subzone of the Coastal Douglas Fir Zone, they may be fairly common in such habitats. Of note in this group are five species of native clovers (Trifolium spp). Species in the categories of greatest rarity include small vulpia (Vulpia microstachys), Howell's bluegrass (Poa howellii), Howell's triteleia (Triteleia howellii), and bicolored flaxflower (Linanthus bicolor).

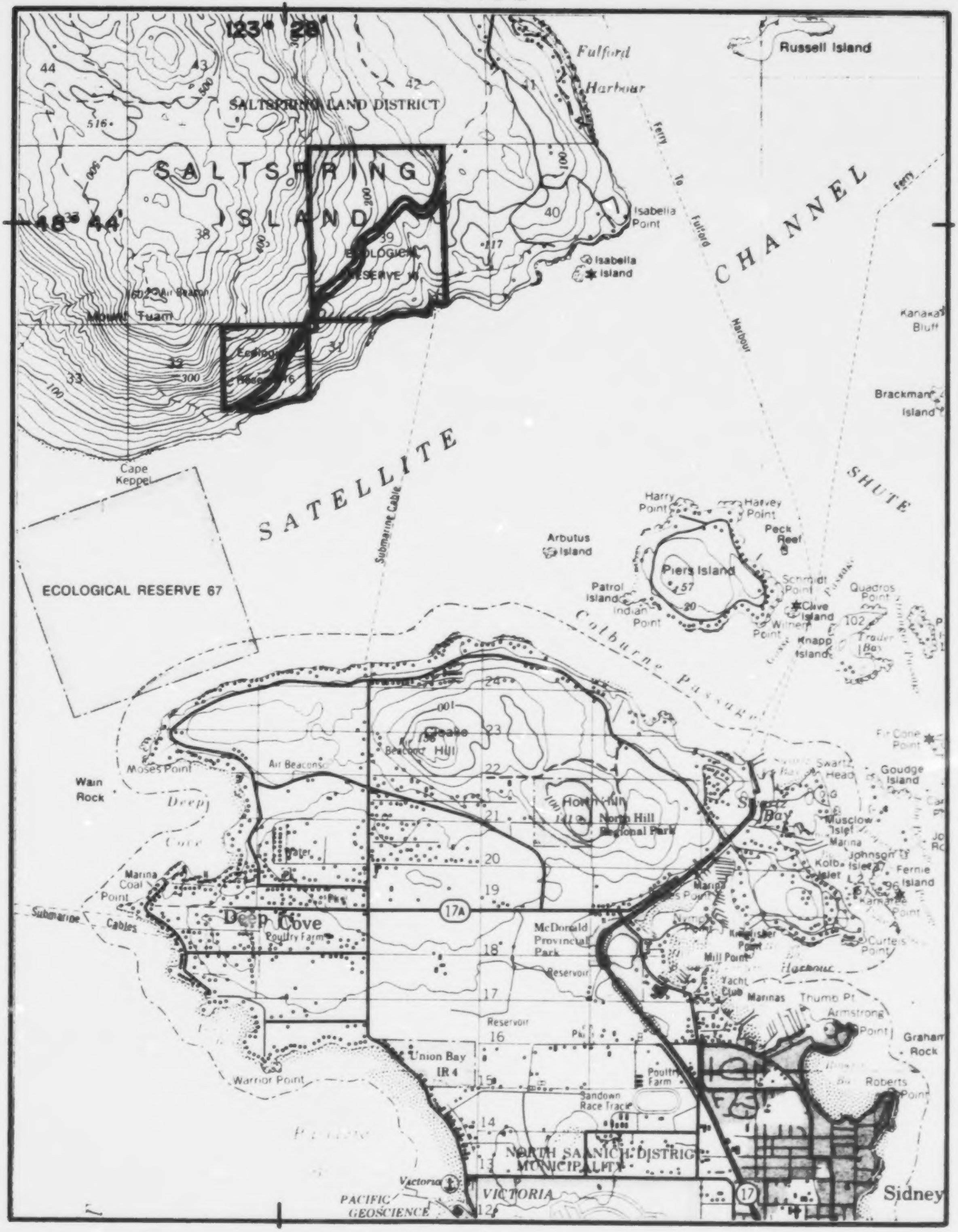
A large variety of birds has been recorded, including turkey vulture, bald eagle, blue grouse, California quail, brown creeper, woodpeckers, and Bewick's wren. Land mammals are limited to black-tailed deer, red squirrel, wandering shrew, racoon, mink, and deer mouse. One species of salamander, two of frogs and three of garter snakes are present. Insects belonging to 57 families have been collected and identified.

OUTSTANDING FEATURES: Pure stands of arbutus; many rare plants.

OTHER INFORMATION: Order-in-Council no. 1578, 4 May 1971, and 576, 19 March 1986 (deletion of road allowance). Application no. 10. Map no. 92 B/11. Road access available from Fulford Harbour.

University of Victoria students under the direction of Dr. M. Bell have prepared reports on the flora, vertebrate fauna, and insects.

2-16 B


123° 28'
48° 44'
SALTSPRING LAND DISTRICT
SALTSPRING ISLAND
ECOLOGICAL RESERVE 16
Mount Tuam
Air Beacon
Ecological Reserve 16
Fulford Harbour
Russell Island
Ferry to Fulford Harbour
Ferry
CHANNEL
Isabella Point
Isabella Island
Kanaka Bluff
Brackman Island
Cape Keppel
ECOLOGICAL RESERVE 67
SATELLITE
Submarine Cable
SHUTE
Harry Point
Harvey Point
Peck Reef
Arbutus Island
Piers Island
Patrol Island
Indian Point
Schmidt Point
Cave Island
Wilner Point
Knapp Island
Quadros Point
Tracer Bay
Colburne Passage
Fir Cone Point
Gougde Island
Swartz Head
Swartz Bay
Musclow Islet
Johnson Islet
Fernie Island
Kolb Islet
Curteis Point
Wain Rock
Moses Point
Air Beacon
Deep Cove
Marina
Coal Point
Submarine Cables
Deep Cove
Poultry Farm
Horth Hill
Horth Hill Regional Park
McDonald Provincial Park
Reservoir
Mill Point
Yacht Club
Marinas
Thumb Pt
Armstrong Point
Graham Rock
Roberts Point
Warrior Point
Union Bay
IR 4
Poultry Farm
Sandown Race Track
NORTH SAANICH DISTRICT MUNICIPALITY
Victoria
PACIFIC GEOSCIENCE
VICTORIA
Sidney
17A
17

SCALE 1:50000

0
1
2
3
4 km

N.T.S.No. 92 B/11

ECOLOGICAL RESERVE No. 16
MOUNT TUAM

CANOE ISLETS

E.R. #17

PURPOSE: To protect nesting cormorants and gulls

LOCATION: At NW entrance to Porlier Pass, adjacent to S end of Valdes Island, 15 km NE of Chemainus

---

SIZE: 0.6 ha LAT: 49°01'N LONG: 123°35'W ELEVATION: 0 - 3 m

BIOGEOCLIMATIC ZONE: Coastal Douglas Fir

PHYSICAL FEATURES:

The reserve consists of two very small, low, rounded bedrock islets, about 400 m from the Valdes Island shoreline. These are composed of glacially smoothed sedimentary rocks of the Nanaimo Group, and lie at the eastern edge of Georgia Strait. Subtidally, strongly sloping bedrock substrates of irregular relief are interupted by narrow sand-shell terraces. The channel between Canoe Islets and Valdes Island is about 20 m deep; depths increase rapidly to the northeast of the islets. Currents are often strong due to the proximity of Porlier Pass.

BIOTIC FEATURES:

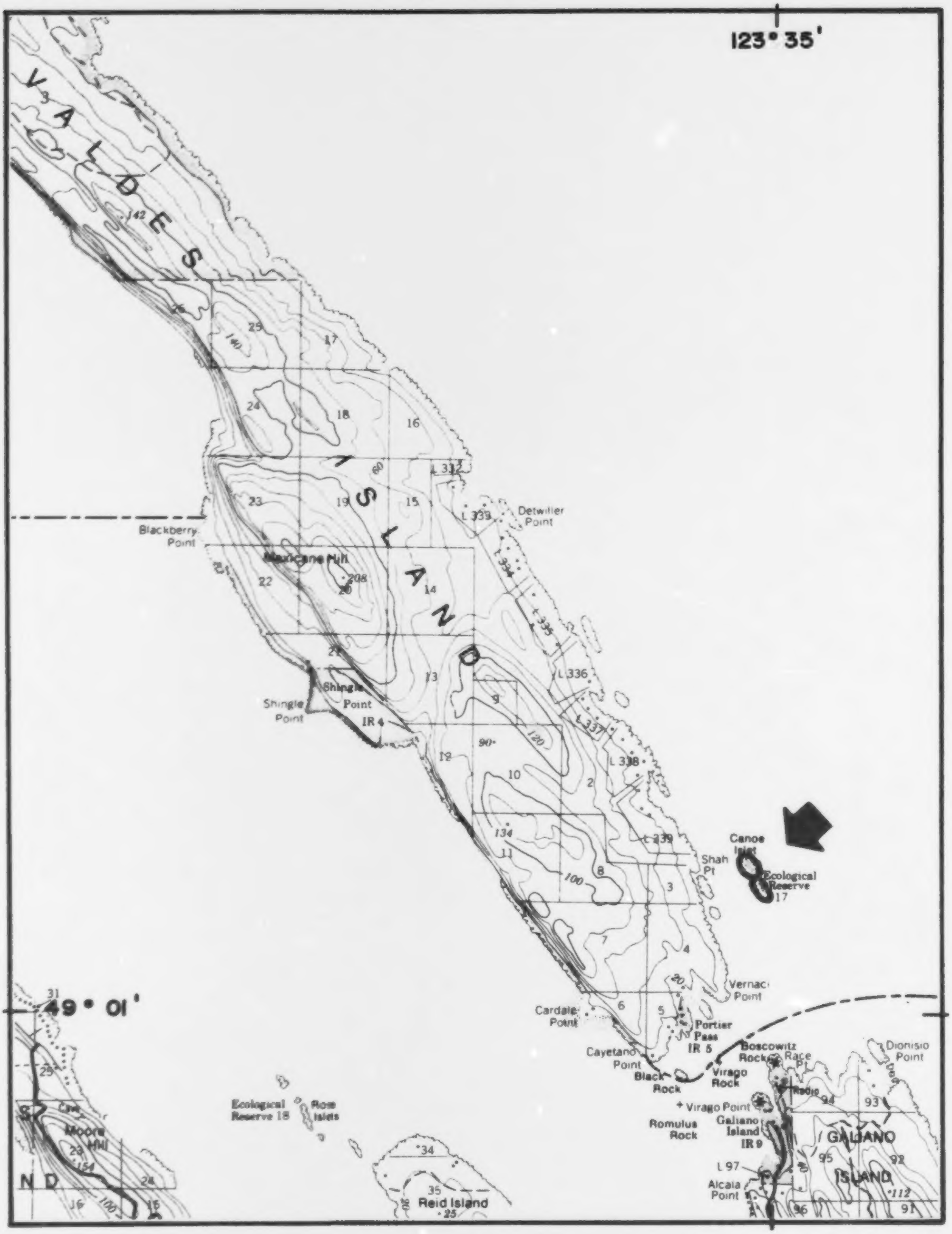
No vascular plants are present, but crustose lichens are common in the splash zone which includes the entire rocks.

Two species of seabirds, the double-crested cormorant and glaucous-winged gull, are known to have nested here. The rocks were not known as a cormorant nesting site until the 1960's, when 30 pairs were counted. These declined to 12 in the 1970's and none in 1981, possibly due to human disturbance. Glaucous-winged gulls began to nest on the rocks in the 1970's and about 60 pairs were present in 1981, their nesting territories covering about 50% of the land area.

Both Steller and California sea lions began using the Porlier Pass area about 1981, coincident with a general increase in numbers of both species in winter in the Gulf of Georgia, where they prey heavily on herring. About 100 Steller and 400-800 California sea lions were present during 1982-1984, of which some have intermittently used Canoe Islets as a winter haul-out, particularly when disturbed from more accessible rocks in Stuart and Trincomali Channels.

OTHER INFORMATION: Order-in-Council no. 1579, 4 May 1971. Application no. 15. Map no. 92 G/4. Marine chart no. 3473. Accessible only by boat but closed to the public by Order-in-Council (no. 1920, 16 June 1977) to protect nesting seabirds, which are extremely vulnerable to disturbance at this location. A permit is required to land on the islets.

Intertidal and subtidal lands are not included in the reserve.


123° 35'
49° 01'
VALDES ISLAND
Blackberry Point
Maxicane Hill
208
Shingle Point
IR 4
Detwiller Point
L 332
L 333
L 334
L 335
L 336
L 337
L 338
L 339
Canoe Islet
Shah Pt
Ecological Reserve 17
Vernaci Point
Cardale Point
Portier Pass IR 5
Cayetano Point
Black Rock
Boscowitz Rock
Race Pt
Virago Rock
Virago Point
Romulus Rock
Galiano Island IR 9
L 97
Alcala Point
Dionisio Point
GALIANO ISLAND
Radio
Ecological Reserve 18
Rose Islets
Reid Island
Moore Hill
N D
1
0
1
2
3
4 km

SCALE 1:50000

N.T.S. No. 92 G/4

ECOLOGICAL RESERVE No. 17
CANOE ISLETS

ROSE ISLETS

E.R. #18

PURPOSE: To protect nesting seabirds

LOCATION: Off N tip of Reid Island, Trincomali Channel, 11 km NE of Chemainus

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SIZE: 0.8 ha LAT: 49°01'N LONG: 123°39'W ELEVATION: 0 - 4 m

BIOGEOCLIMATIC ZONE: Coastal Douglas Fir

PHYSICAL FEATURES:

The reserve includes a chain of five low rocky islets oriented in a northwest-southeast direction. These are made up of glaciated and wave-worn sedimentary bedrock of the Nanaimo Group, and located between Thetis and Valdes Islands in northern Trincomali Channel. The three largest islets have small areas of shallow soil sufficient for vascular plant establishment. Intertidal shorelines are predominantly bedrock. Surrounding waters in Trincomali Channel are mostly 20 to 30 m in depth. Currents are minor, and wave action is tempered by the sheltered location among the Gulf Islands.

BIOTIC FEATURES:

Approximately 40 species of plants, including vascular species, bryophytes, and lichens, are present on the three largest islets. These are species typical of shallow soil and rocky crevice habitats subjected to summer drought associated with the cool-summer Mediterranean climate. Herbs, grasses, and a few shrubs are present, but no trees. Vegetation patterns appear to be greatly influenced by soil depth, exposure, and possibly by nesting cormorants.

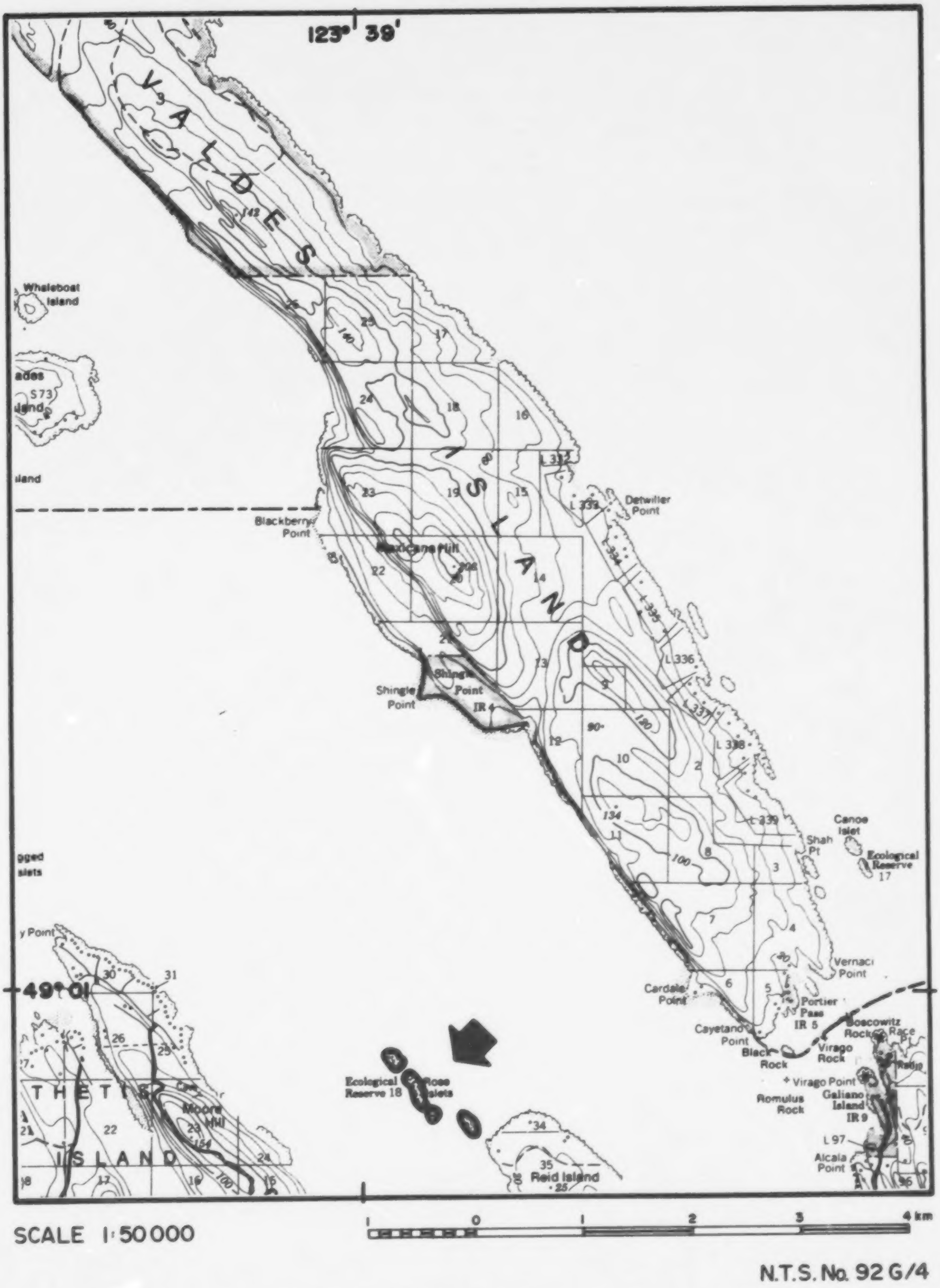
About 180 pairs of double-crested cormorants nested here in 1968, but the number declined to 80 by 1975, 33 in 1981 and 12 in 1983. At least 20 pairs of glaucous-winged gulls nest on the islets. A few pigeon guillemots and black oystercatchers occur, and may nest. Several other species of seabirds utilize surrounding waters, especially in winter and spring.

Algae in adjacent intertidal-subtidal habitats include sea lettuce (Ulva sp), five species of brown algae and 23 of red algae.

OTHER INFORMATION: Order-in-Council no. 1580, 4 May 1971. Application no. 15. Map no. 92 G/4. Marine chart no. 3443. Accessible only by boat but closed to the public by Order-in-Council (no. 1920, 16 June 1977) to protect nesting seabirds, which are extremely vulnerable to disturbance at this location. A permit is required to land on Rose Islets. Considerable recreational boating occurs in this area in summer.

Intertidal and subtidal lands are not included in the reserve.

2-18B


123° 39'
VALDES ISLAND
Whaleboat Island
Valdes Island
S73
Blackberry Point
Mexicana Hill
202
Shingle Point
Shingle Point IR 4
Detwiler Point
L 332
L 333
L 334
L 335
L 336
L 337
L 338
L 339
Canoe Islet
Ecological Reserve 17
Shah Pt
Vernaci Point
Cardale Point
Cayetano Point
Portier Pass IR 5
Black Rock
Boscowitz Rock
Race Pt
Virago Rock
Virago Point
Romulus Rock
Galiano Island IR 9
L 97
Alcala Point
49° 01'
THETIS ISLAND
Moore Hill
Ecological Reserve 18
Rose Islets
Reid Island
1
0
1
2
3
4 km

SCALE 1:50000

N.T.S. No. 92 G/4

ECOLOGICAL RESERVE No. 18
ROSE ISLETS

MOUNT SABINE

E.R. #19

PURPOSE: Preservation of a forest site representative of the Montane Spruce Zone east of the Rocky Mountain Trench

LOCATION: On Mount Sabine, 3 km NNE of Canal Flats

SIZE: 7.9 ha LAT: 50°11'N LONG: 115°48'W ELEVATION: 1340 - 1400 m

BIOGEOCLIMATIC ZONE: Montane Spruce

PHYSICAL FEATURES:

The reserve is situated on gently sloping terrain just north of the summit of Mount Sabine, which marks the southern extremity of the Stanford Range. It has a slight slope to the northwest. Local soils, developed on morainal material which has a limestone component, are believed to be Brunisols. Climate is somewhat cooler and moister in the reserve than on the floor of the adjacent Rocky Mountain Trench 600 m below.

BIOTIC FEATURES:

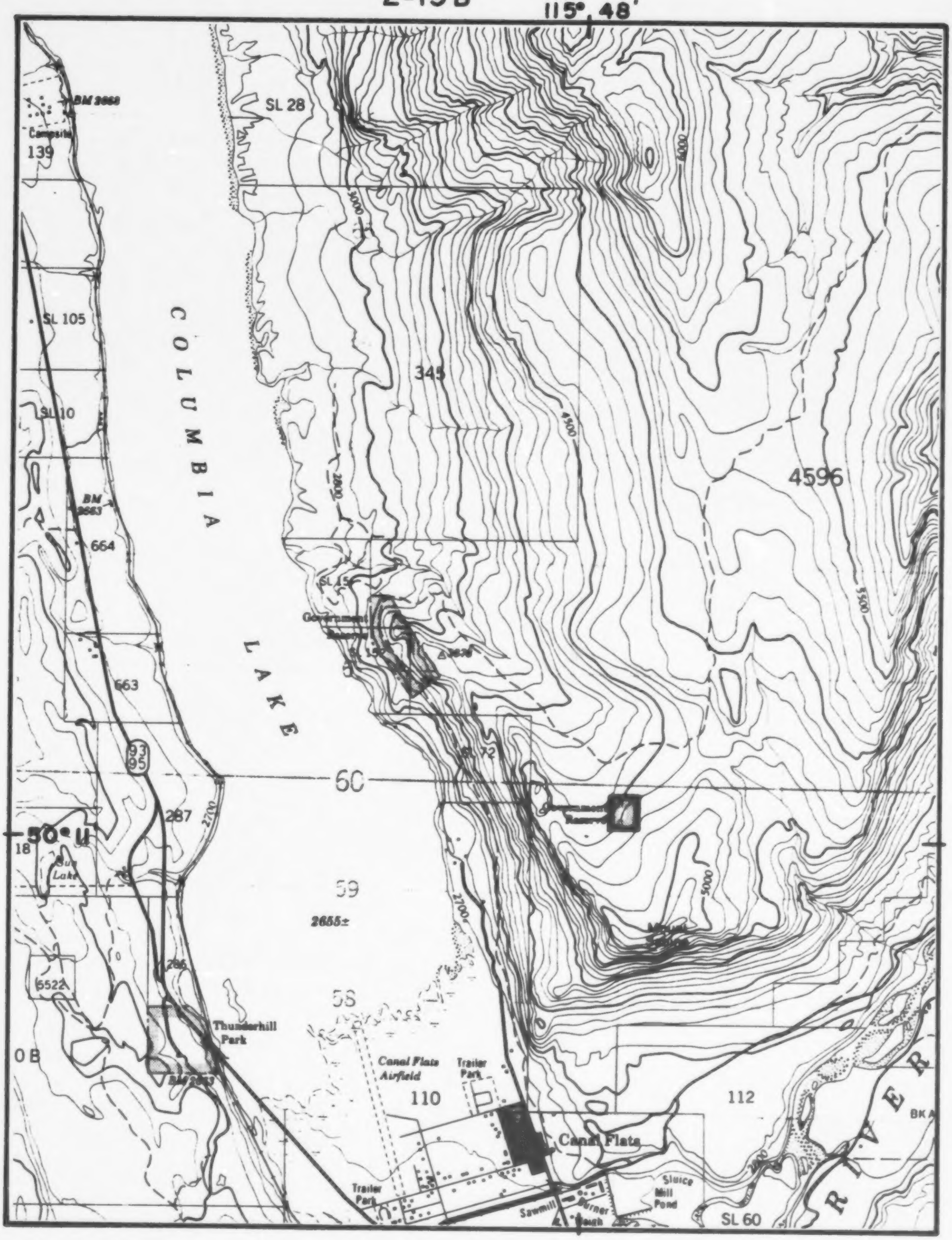
Forests here typically consist of a mixture of western larch, Douglas fir, Engelmann spruce, and lodgepole pine in roughly equal proportions. Subalpine fir may be co-dominant in some areas, and paper birch is also present. The tallest trees are western larch, up to about 25 m tall and perhaps 120 years in age. Conifer regeneration includes Engelmann spruce, subapline fir, and Douglas fir. These woodlands have a rather sparse shrub layer containing species such as soopolallie, western snowberry, Douglas maple, low Oregon-grape, red twinberry, prickly rose, and Saskatoon. Ground cover is dominated by showy aster, pinegrass, and mosses. Other typical herbs include western meadowrue, twinflower, prince's pine, one-sided wintergreen, green wintergreen, rattlesnake-plantain, violets, northern bedstraw, wild strawberry, red columbine, rough-fruited fairybells and heart-leaved arnica.

The fauna has not been surveyed. Mule and white-tailed deer and elk occur in the area, as well as a variety of smaller mammals and birds.

OTHER INFORMATION: Order-in-Council no. 1581, 4 May 1971. Application no. 46. Map no. 82 J/4. Access via a logging road up the west side of Mount Sabine from Canal Flats.

Forest cover in the reserve has been modified by pine beetle mortality and selective logging and much logging has occured on adjacent lands. Though old logging roads pass through the reserve, the vegetation has recovered without significant weed invasion.

2-19B


115°, 48'
50° 41'
SL 28
BM 2668
Campsite
139
SL 105
SL 10
BM 2663
664
663
93
95
287
18
Sun Lake
6522
0B
Thunderhill Park
BM 2653
COLUMBIA
LAKE
345
4596
SL 15
Government Reserve
15
SL 72
60
59
58
2655±
Government Reserve
Mount Sabine
Canal Flats Airfield
Trailer Park
110
Canal Flats
112
Trailer Park
Sawmill
Burner
Sluice
Mill Pond
SL 60
BKA
RIVER
3000
2800
2700
4500
5000
5500
6000

SCALE 1:50000

1 0 1 2 3 4km

N.T.S. No. 82 J/4

ECOLOGICAL RESERVE No. 19
MOUNT SABINE

COLUMBIA LAKE E.R. #20

PURPOSE: Protection of calcicolous vegetation and ecosystems representative of the Interior Douglas Fir Zone

LOCATION: E side of Columbia Lake, 4.5 km N of Canal Flats

SIZE: 32 ha LAT: 50°12'N LONG: 115°49'W ELEVATION: 945 - 1160 m

BIOGEOCLIMATIC ZONE: Interior Douglas Fir

PHYSICAL FEATURES:

The reserve lies mostly on the west-facing slope of a north - south trending ridge, about 300 m east of Columbia Lake and 150 m higher in elevation. Slope exposure is mostly to the west and southwest which together with the rain shadow effect of the Selkirk and Purcell Mountains results in a locally dry climate. Exposed bedrock, including low cliffs and small talus slopes, is frequent. The bedrock is limestone and this is reflected in the soils derived from it. A small spring-fed stream in the southern end of the reserve has a bed crusted with calcium carbonate.

BIOTIC FEATURES:

Of major significance here are limestone loving (calcicolous) plants growing in wet sites along the stream and on limestone cliffs. In the restricted area of riparian habitat, common shrubs are water birch, red-osier dogwood, and shrubby cinquefoil; frequent herbs are Kalm's lobelia, grass-of-Parnassus, common harebell, fringed aster, white prairie aster, prickly lettuce, yellowish paintbrush and green-flowered bog-orchid. Rare plants in these habitats include annual Indian paintbrush (Castilleja exilis), sulphur Indian paintbrush (C. sulphurea), and marsh muhlenbergia (Muhlenbergia glomerata). Two rare ferns have been recorded on limestone cliffs here - slender lip fern (Cheilanthes feei) and purple cliff-brake (Pellaea atropurpurea). One limber pine tree (Pinus flexilis, rare in the province) grows in the reserve, well below its usual alpine habitat.

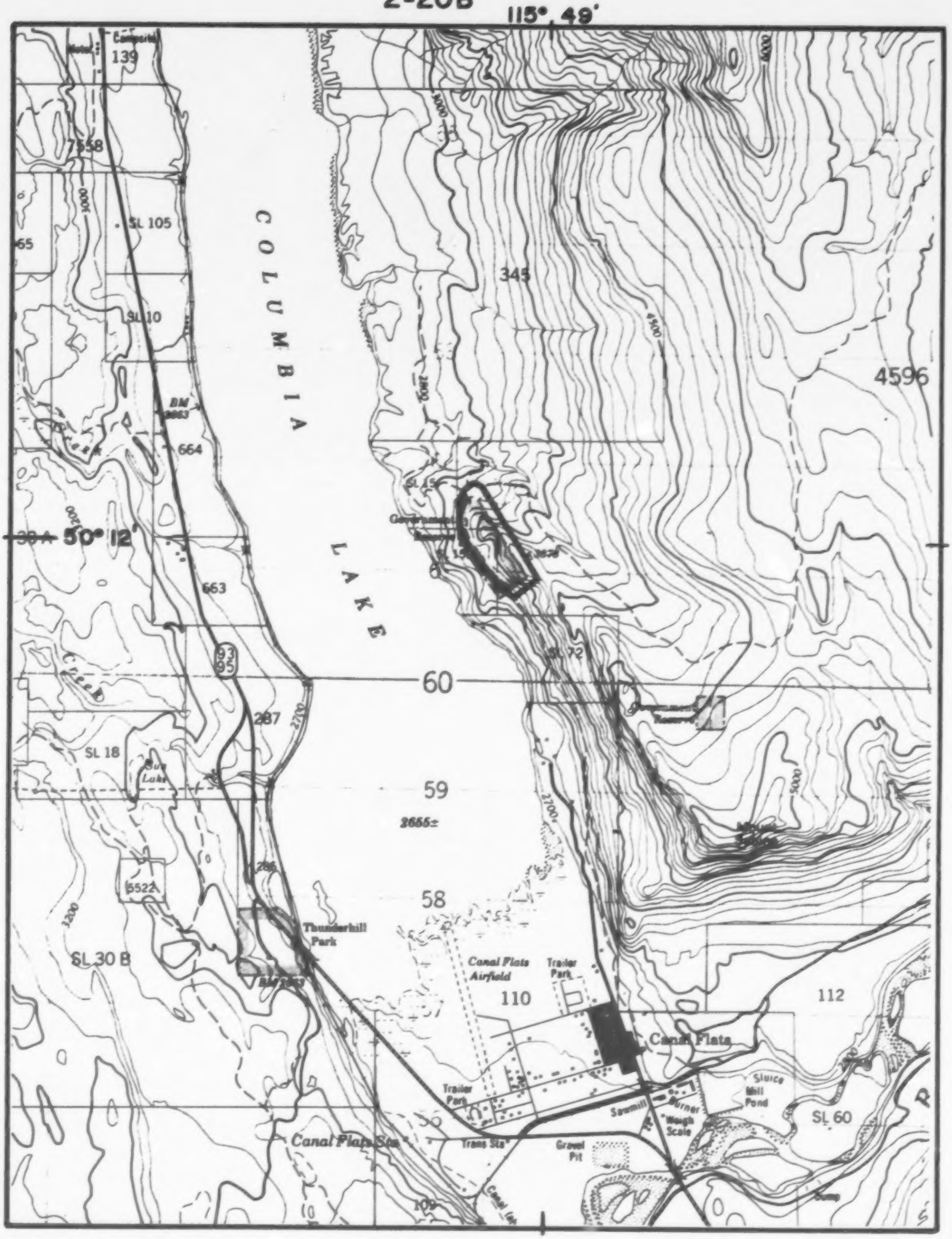
Well-spaced Douglas fir trees cover most of the reserve and junipers of three species are also common. The Douglas fir - pinegrass type is extensive, while the fir - snowberry association occurs in moister sites and the fir - bluebunch wheatgrass - rabbitbush community in the driest situations. Ponderosa pine, lodgepole pine, and trembling aspen are also present. Rare upland plants recorded in the reserve included sparrow's egg lady's slipper (Cypripedium passerinum), tufted fleabane (Erigeron caespitosus), wood lily (Lilium philadelphicum), yellow gromwell (Lithospermum incisum), and an as yet unidentified species of Townsendia.

The reserve is part of an important winter range for mule deer, elk, and bighorn sheep. Grazing and browsing is evident; trails and droppings frequent.

OUTSTANDING FEATURES: Rare plants associated with calcareous habitats.

OTHER INFORMATION: Order-in-Council no. 1582, 4 May 1971, and 2095, 2 June 1972 (boundary extension). Application no. 48. Map no. 82 J/4.

2-20B


115° 49'
50° 12'
COLUMBIA LAKE
139
7558
SL 105
SL 10
BM 2663
664
663
93
95
287
2700
SL 18
5522
SL 30 B
Thunderhill Park
345
4596
4500
5000
SL 15
Government Reserve
SL 72
60
59
2655±
58
Canal Flats Airfield
Trailer Park
110
112
Canal Flats
Sluice
Mill Pond
Trailer Park
Sawmill
Burner
Weigh Scale
Gravel Pit
Trans Sta
SL 60
Canal Flats Sta
109

SCALE 1:50000

0 1 2 3 4 km

N.T.S. No. 82 J/4

ECOLOGICAL RESERVE No. 20
COLUMBIA LAKE

SKAGIT RIVER FOREST E.R. #21

PURPOSE: To preserve representative valley-bottom forest in an area transitional between coastal and interior climatic conditions

LOCATION: Skagit River valley, 38 km SE of Hope and 10 km NW of Ross Lake

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SIZE: 73 ha LAT: 49°06'N LONG: 121°07'W ELEVATION: 525 - 570 m

BIOGEOCLIMATIC ZONE: Interior Douglas Fir

PHYSICAL FEATURES:

The reserve lies in the Skagit River valley, bounded in the west by the Skagit Range and east by the Hozameen Range. Local peaks rise to the 2150 m elevation. It is primarily on the alluvial fan of Shawatum Creek, which slopes gently to the southwest. The surficial deposits are generally coarse and well-drained. Annual precipitation, about 110 cm, is intermediate between the coast and dry interior due to a partial rain-shadow caused by the Skagit Range.

BIOTIC FEATURES:

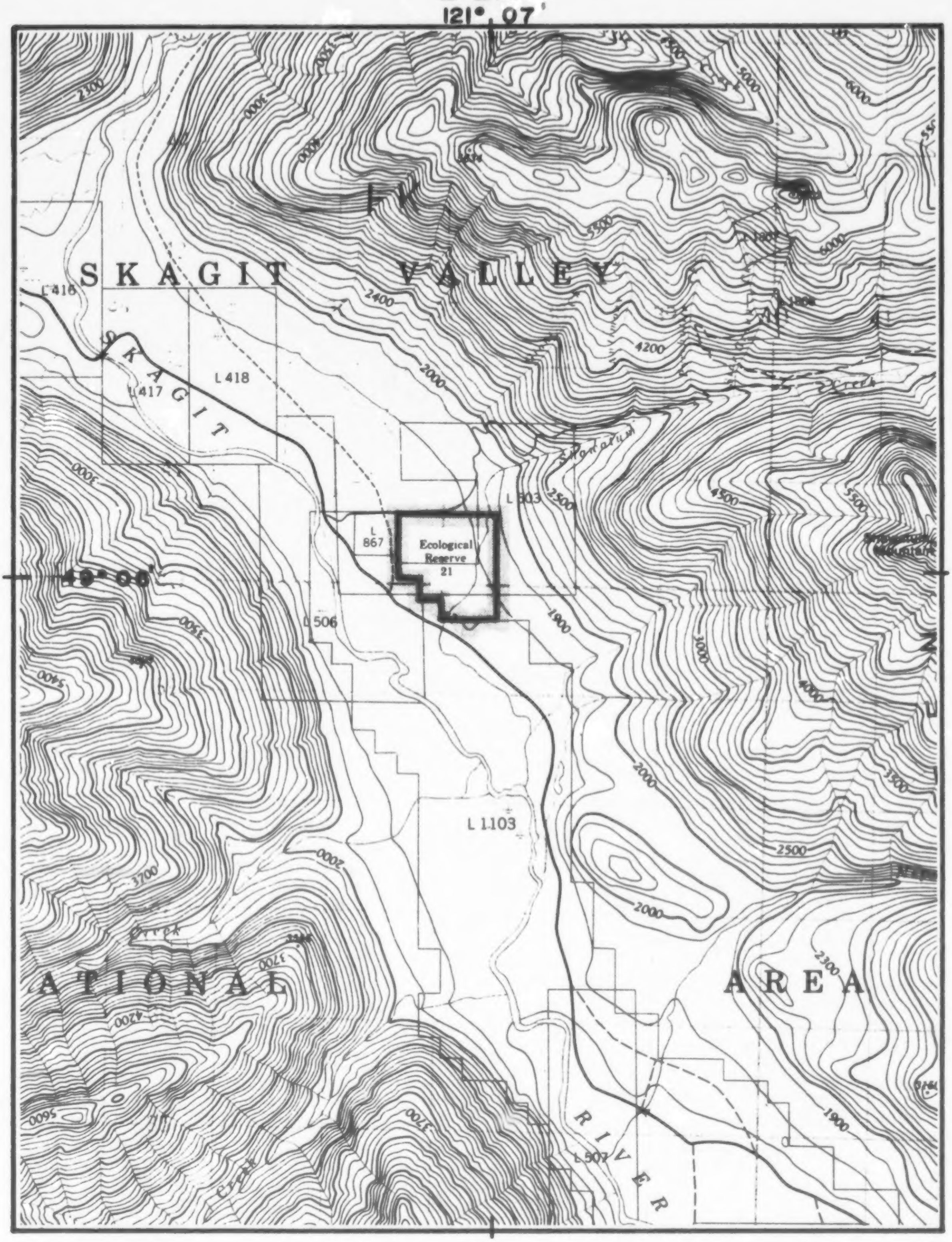
Several coastal plants such as vine maple and devil's club are at their eastern limits of distribution in this valley, and several interior plants are found no further west. Douglas fir stands here are spatially well separated from and at considerably higher elevation than most Coastal Douglas Fir forests fringing the Gulf of Georgia, suggesting that assignment to the Interior Douglas Fir zone is appropriate even though many coastal plants occur in the valley.

Douglas fir is the dominant tree over most of the reserve, although shrubby alluvial areas with few trees occur in the eastern half. Typical Douglas fir woods contain some western redcedar and western white pine, have a tall shrub layer dominated by vine maple, and considerable vanilla leaf in the herb layer. Other common plants are Oregon-grape, trillium, queen's cup, sweet-scented bedstraw, wild ginger, one-leaved foamflower, Hooker's fairybells, and the moss Rhytidiadelphus loreus. In more moist sites there is a Douglas fir - western redcedar association in which black cottonwood may occur and devil's club, lady fern and mosses of the genus Mnium are characteristic in the understory. Other plants in this type include spiny wood fern, oak fern, yellow violet, and star-flowered false Solomon's-seal. Well drained gravelly outwash fans support kinnikinnick and falsebox.

OTHER INFORMATION: Order-in-Council no. 1583, 4 May 1971. Application no. 53. Map no. 92 H/3. Within Skagit Valley Recreation Area. Access via Silver-Skagit Road from Hope.

Some logging disturbance has occurred in the past.

2-21B


121°, 07'
49° 00'
SKAGIT VALLEY
SKAGIT
ATIONAL
AREA
RIVER
Ecological Reserve 21
L 416
L 417
L 418
L 867
L 303
L 506
L 1103
L 507
Creek
2300
3000
4000
4500
5000
5500
6000
2400
2000
4200
2500
1900
3500
3700
4200
5600
5400

SCALE 1:50000

1 0 1 2 3 4 km

N.T.S. No. 92 H/3

ECOLOGICAL RESERVE No. 21
SKAGIT RIVER FOREST

ROSS LAKE E.R. #22

PURPOSE: To preserve an isolated population of ponderosa pines and other vegetation in a location transitional between coastal and interior climates.

LOCATION: E side of the head of Ross Lake, 50 km SE of Hope

SIZE: 61 ha LAT: 49°00'N LONG: 121°03'W ELEVATION: 525 - 760 m

BIOGEOCLIMATIC ZONE: Interior Douglas Fir

PHYSICAL FEATURES:

The reserve is situated on the lower slopes of Mount Hozameen, Cascade Mountains, on the east side of the Skagit River valley. Adjacent peaks rise to about 2000 m. The reserve has a westerly aspect and average slope of 25 to 30%. Surficial materials are largely colluvial, and several areas of bedrock outcrop occur. Annual precipitation, about 110 cm, is intermediate between that of the coast and the interior due to a partial rain-shadow caused by the Skagit Range which lies to the west.

BIOTIC FEATURES:

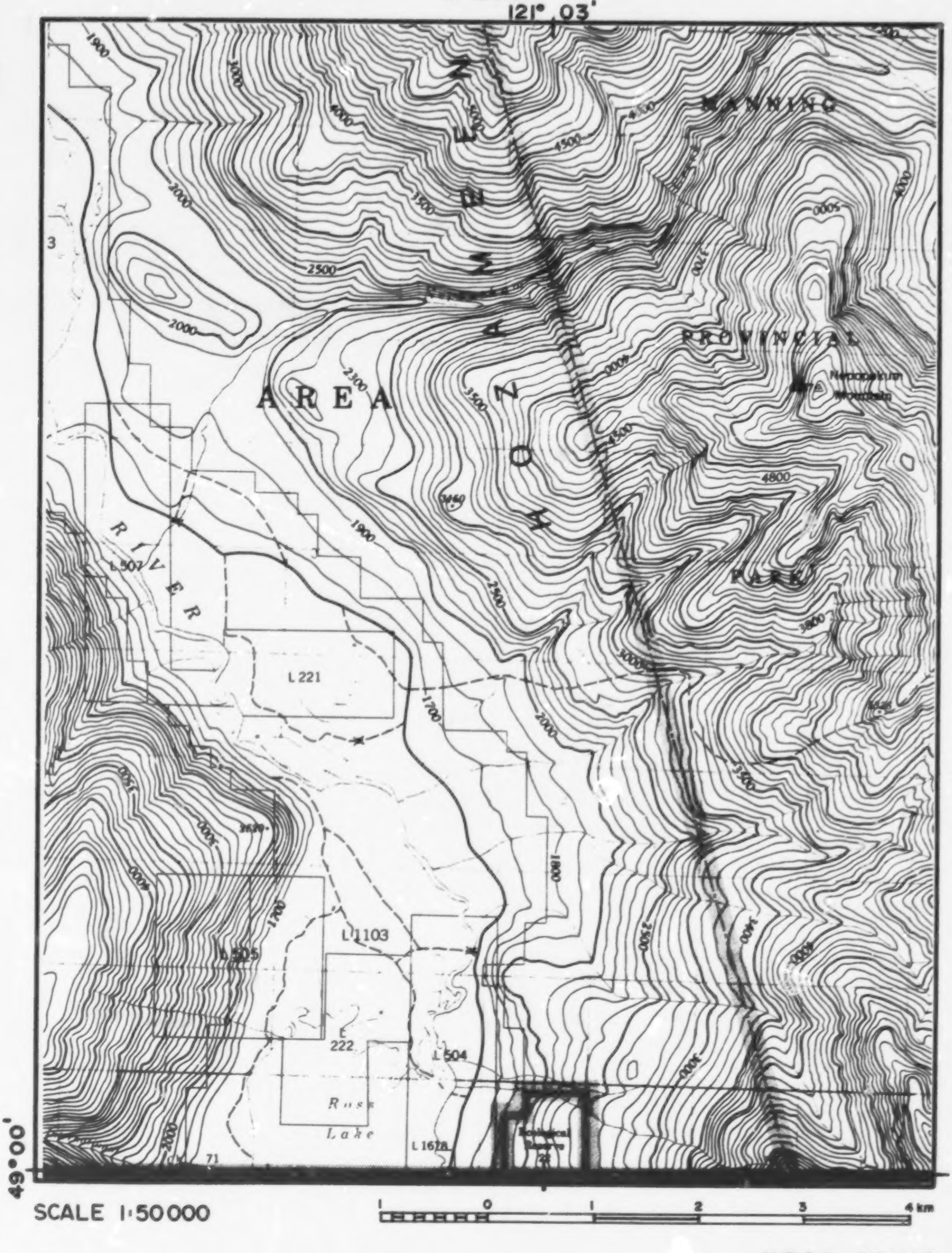
Of major interest here is the occurrence of ponderosa pine trees and associated dry-site plants in a semi-coastal environment. Southwestern exposure and rocky, well-drained soils, together with the reduced precipitation regime allow these species, which may be remnants of formerly more widespread dry forest in this area, to persist in a marginal environment. Ponderosa pine trees occupy a small central part of the reserve, and have an understory dominated by kinnikinnick and bluebunch wheatgrass. Douglas fir forests cover most of the reserve, and associations having affinities with both coastal and interior zones have been noted. On dry sites a Douglas fir - kinnikinnick - pinegrass association is present, while in mesic locations a Douglas fir - Oregon-grape - moss association has developed. This contains typically coastal species such as vine maple, and interior ones like soopolallie. A typically coastal forest type, the western redcedar - devil's club - foamflower - moss association occurs in moist gullies and seepage areas. Coastal trees like bigleaf maple and grand fir occur sporadically in this forest community.

The Skagit Valley also has a diverse bird and mammal fauna containing both coastal and interior species.

OUTSTANDING FEATURES: The most westerly ponderosa pine - bunchgrass vegetation at this latitude in British Columbia. A very rare plant occuring here is the steer's head (Dicentra uniflora).

OTHER INFORMATION: Order-in-Council no. 1584, 4 April 1971. Application no. 54. Map no. 92 H/3. Access via Silver-Skagit Road from Hope, and 0.5 km hike from that road at Ross Lake. The reserve is within the Skagit Valley Recreation Area.

Logging and fire have influenced the Douglas fir forest.


121° 03'
MANNING
PROVINCIAL
PARK
Nepopekum Mountain
HOZAMEEN
AREA
RIVER
L 507
L 221
L 1103
L 505
L 504
222
Ross Lake
L 1678
Ecological Reserve 22
71
3
49°00'
4500
4000
3500
3000
2500
2000
1900
1800
1700
4800
SCALE 1:50 000
1 0 1 2 3 4 km

N.T.S. No. 92 H/3

ECOLOGICAL RESERVE No. 22
ROSS LAKE

MOORE, MCKENNEY, AND WHITMORE ISLANDS E.R. #23

PURPOSE: To preserve the nesting sites of several species of colonial seabirds

LOCATION: Off Aristazabal Island, E side of Hecate Strait, 100 km NW of Bella Bella

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SIZE: 73 ha LAT: 52°37' - 52°40'N LONG: 129°23' - 129°30'W
ELEVATION: 0 - 58 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

The reserve comprises a group of low-lying islands, islets, and reefs along the east side of Hecate Strait. The largest island, South Moore, makes up most of its land area. The islands are deeply incised, and have generally rocky, sloping shorelines with few cliffs. Though exposed to the southwest, the effects of surf are probably moderated slightly due to protection given by the Queen Charlotte Islands, which lie to the west.

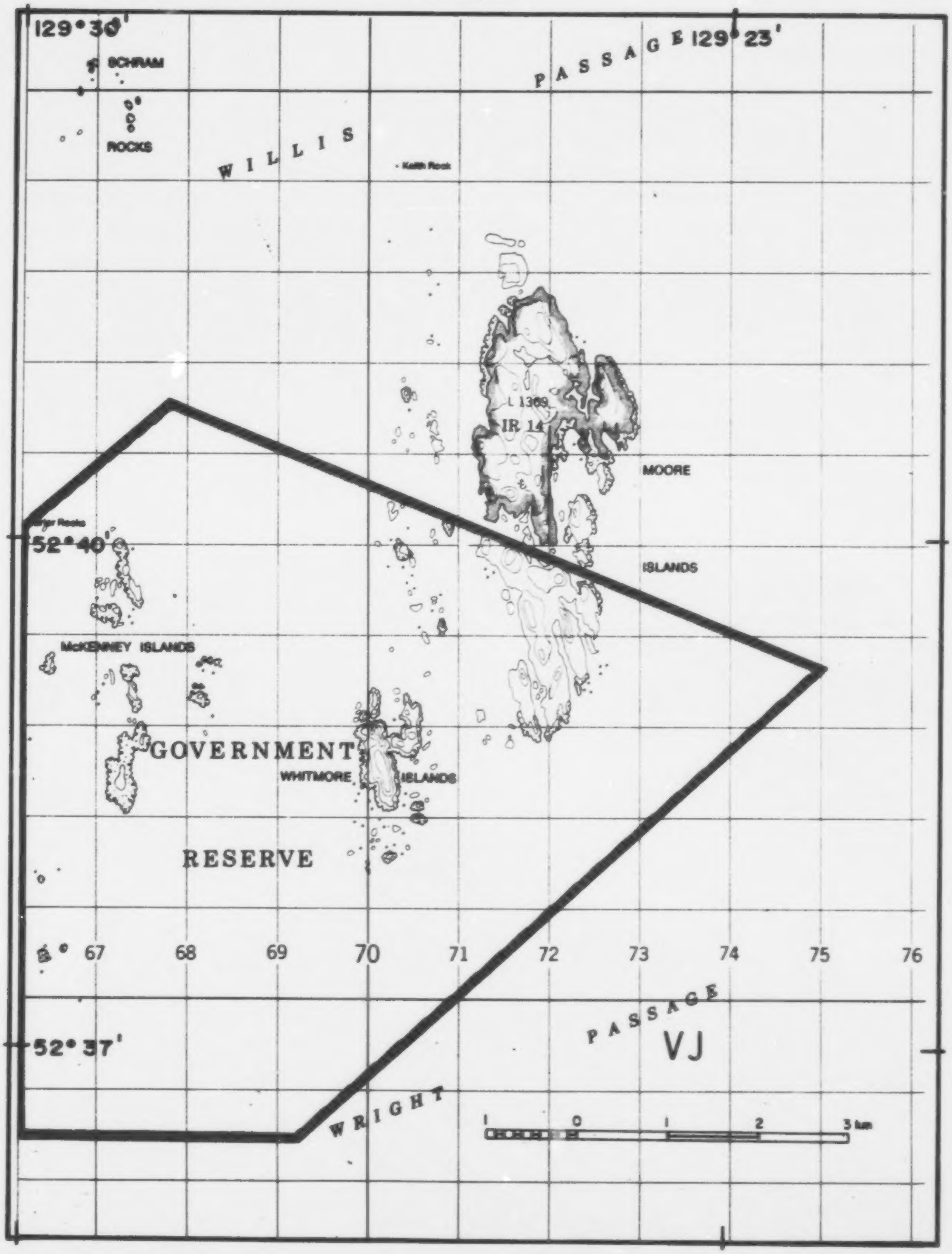
BIOTIC FEATURES:

The larger islands have forest dominated by Sitka spruce over most of their area; headlands and some small islands have shrub and herb cover. Typical spruce forests have an understory of salal or false lily-of-the-valley and mossy ground cover. In sheltered locations the forest also contains yellow cedar, western hemlock, western yew, and shore pine. Common shrubs include salal, Sitka alder, and red elderberry. Exposed headlands have wind-pruned trees, often festooned with lichens. Treeless headlands and islands commonly have stands of Pacific reedgrass and/or dune wildrye, and several forbs including Pacific whitlow-grass, a species which occurs on sites enriched by droppings of nesting seabirds.

The fork-tailed storm-petrel nests on the smaller islets; Leach's storm-petrel uses both the small islets and headlands of Moore Island. Scattered pairs of Cassin's auklets nest on the small outer islands, as well as about 30 pairs of tufted puffins and 40 pairs of glaucous-winged gulls. An unknown number of ancient murrelets, previously not known to breed outside the Queen Charlotte Islands (in British Columbia) is present on South Moore and the smaller islands. A large colony of rhinoceros auklets occurs on Moore Island. This island also supports numerous pairs of pigeon guillemots, and is a probable nesting place of marbled murrelets. Other birds thought to nest on the islands but not confirmed, include the black oystercatcher, belted kingfisher, northwestern crow, chestnut-backed chickadee, winter wren, varied thrush, and Swainson's thrush.

OUTSTANDING FEATURES: A diversity of nesting seabirds.

OTHER INFORMATION: Order-in-Council no. 1585, 4 May 1971. Application no. 57. Map no. 103 A/11. Marine Chart no. 3726. Accessible by boat but closed to the public by Order-in-Council (no. 1920, 16 June 1977) to protect nesting birds and their habitat. Subtidal environments not included.


129°30'
129°23'
SCHRAM
ROCKS
WILLIS
PASSAGE
Keith Rock
L 1369
IR 14
MOORE
ISLANDS
52°40'
McKENNEY ISLANDS
GOVERNMENT
WHITMORE
ISLANDS
RESERVE
67
68
69
70
71
72
73
74
75
76
52°37'
PASSAGE
VJ
WRIGHT
1
0
1
2
3 km

SCALE 1:60000

N.T.S. No. 103 A/11

ECOLOGICAL RESERVE No. 23
MOORE/McKENNEY/WHITMORE ISLANDS

BAERIA ROCKS

E.R. #24

PURPOSE: To protect nesting seabirds, and to preserve rich intertidal and subtidal communities for research and educational purposes

LOCATION: At head of Imperial Eagle Channel, Barkley Sound, west coast of Vancouver Island

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SIZE: 53 ha LAT: 48°57'N LONG: 125°09'W ELEVATION: -37 to 10 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

The terrestrial part of the reserve consists of two low bedrock islands 500 m apart, the southern of which is made up of three closely associated rocks. The bulk of the reserve consists of the subtidal area between the rocks and the 20 fathom (36.5 m) depth. Intertidal and subtidal substrates are largely bedrock, although small areas of mud, sand or shell occur at depth. Surf action is moderated due to distance from the outer coast.

BIOTIC FEATURES:

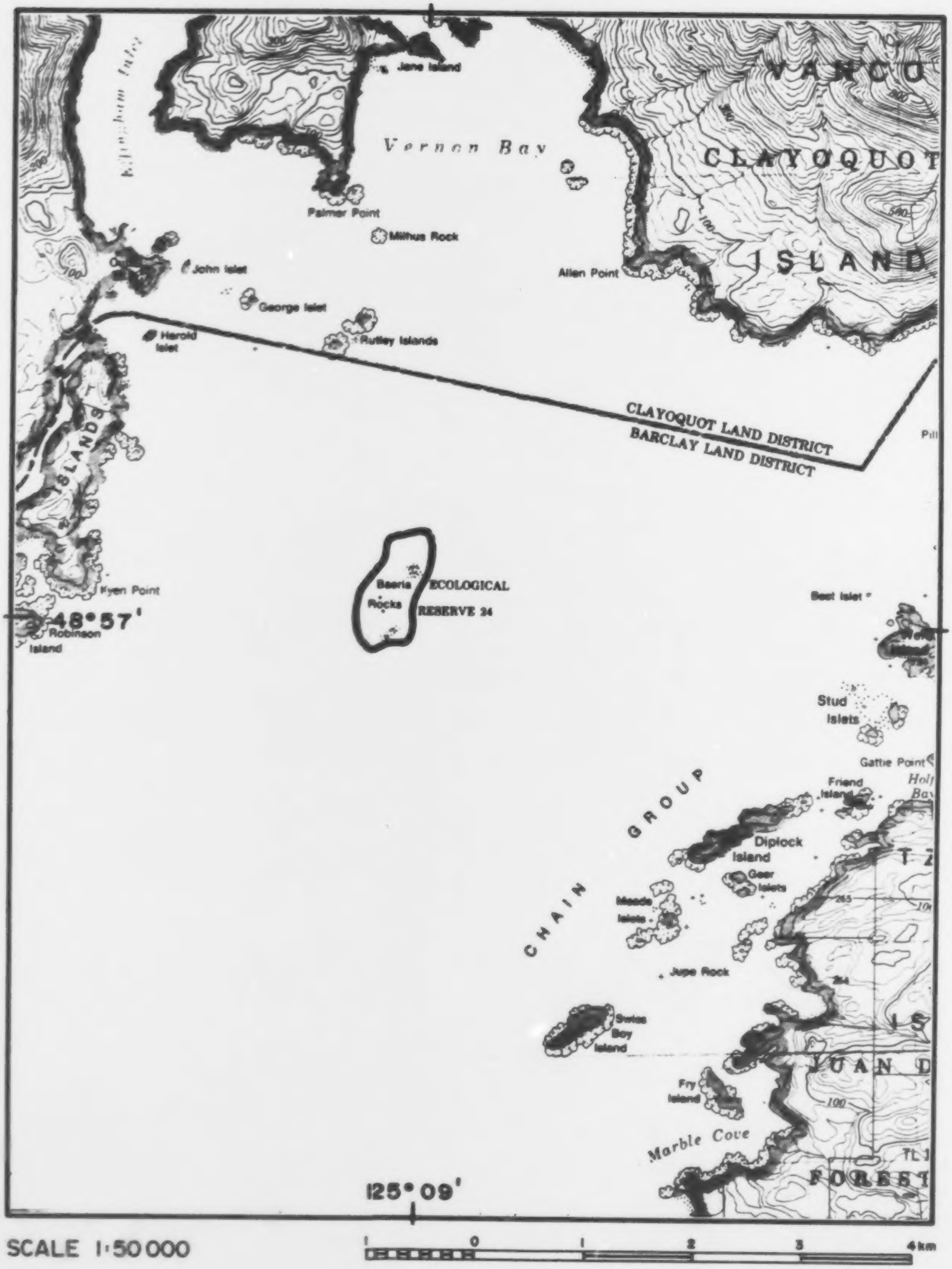
Vascular plants are limited to a single species, hairy goldfields (*Lasthenia minor*), found near the highest point of the north island. This species is rare in British Columbia. Several crustose lichens, adapted to salt spray, also occur. Nesting seabirds are the pelagic cormorant (30 pairs), glaucous-winged gull (210 pairs), black oystercatcher (15 pairs), and probably the pigeon guillemot. A few harbour seals haul out here.

Despite the predominantly bedrock substrates, a variety of intertidal habitats are present, including rock faces exposed to the surf, crevices, tide pools, and a protected lagoon in the north island. The intertidal shoreline is almost completely covered with marine invertebrates and algae, the most common of which are barnacles (*Balanus cariosus* and *B. glandula*) goose barnacles (*Pollicipes polymerus*), mussels (*Mytilus edulis* and *M. californianus*), sea anemones (*Anthopleura xanthogrammica* and *A. elegantissima*), starfish (*Pisaster ochraceous*) and seaweeds of the genera *Endocladia*, *Fucus*, *Ulva*, *Egregia* and *Alaria*. Interesting examples of intertidal zonation are present. The surrounding subtidal area supports a diverse invertebrate fauna that is particularly abundant in hydroids, ascidians, and anemones (particularly *Tealia lofotensis*), and several species of algae. Common fishes are the black, yellowtail, copper, quillback, and China rockfishes, and the kelp greenling.

OTHER INFORMATION: Order-in-Council no. 1586 (terrestrial area), 4 May 1971, and 3295 (ammendment to include subtidal area), 24 Oct. 1975. Application no. 59. Map no. 92 C/14. Marine Chart no. 3637. Accessible by boat, but closed to the public by Order-in-Council (no. 1920, 16 June 1977) to protect nesting seabirds which are very vulnerable to disturbance here.

This is an excellent teaching and research site for the Bamfield Marine Station, 13 km away. Reports are available on intertidal and subtidal flora and fauna, and harbour seal behaviour.

2-24B


Effingham Inlet
Jane Island
Vernon Bay
VANCO
CLAYOQUOT
ISLAND
Palmer Point
Milhus Rock
John Islet
George Islet
Allen Point
Harold Islet
Rutley Islands
CLAYOQUOT LAND DISTRICT
BARCLAY LAND DISTRICT
ISLANDS
Kyen Point
48°57'
Robinson Island
Baeria Rocks
ECOLOGICAL RESERVE 24
Best Islet
Stud Islets
Gattie Point
Friend Island
CHAIN GROUP
Diplock Island
Geer Islets
Meade Islets
Jupe Rock
Swiss Boy Island
Fry Island
Marble Cove
JUAN D
FOREST
125°09'
1
0
1
2
3
4 km

SCALE 1:50000

N.T.S. No. 92 C/14

ECOLOGICAL RESERVE No. 24
BAERIA ROCKS

DEWDNEY AND GLIDE ISLANDS

E.R. #25

PURPOSE: To provide a research area containing extensive bog and fen ecosystems representative of outer islands along the northern mainland coast

LOCATION: Eastern Hecate Strait, 150 km ESE of Sandspit

SIZE: 3845 ha LAT: 52°58'N LONG: 129°35'W ELEVATION: 0 - 130 mm

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

Most of the reserve is made up by low-lying Dewdney Island, the southernmost of the Estevan Group, which at low tide is connected to Barnard Island on the north. Many small islands, islets and reefs occur around its perimeter, including the Glide Islands 4 km to the east and totalling about 10 ha. The indented Dewdney Island shoreline, over 60 km in length, ranges from rocky headlands and coves to boulder, sand, and shingle beaches and muddy lagoons.

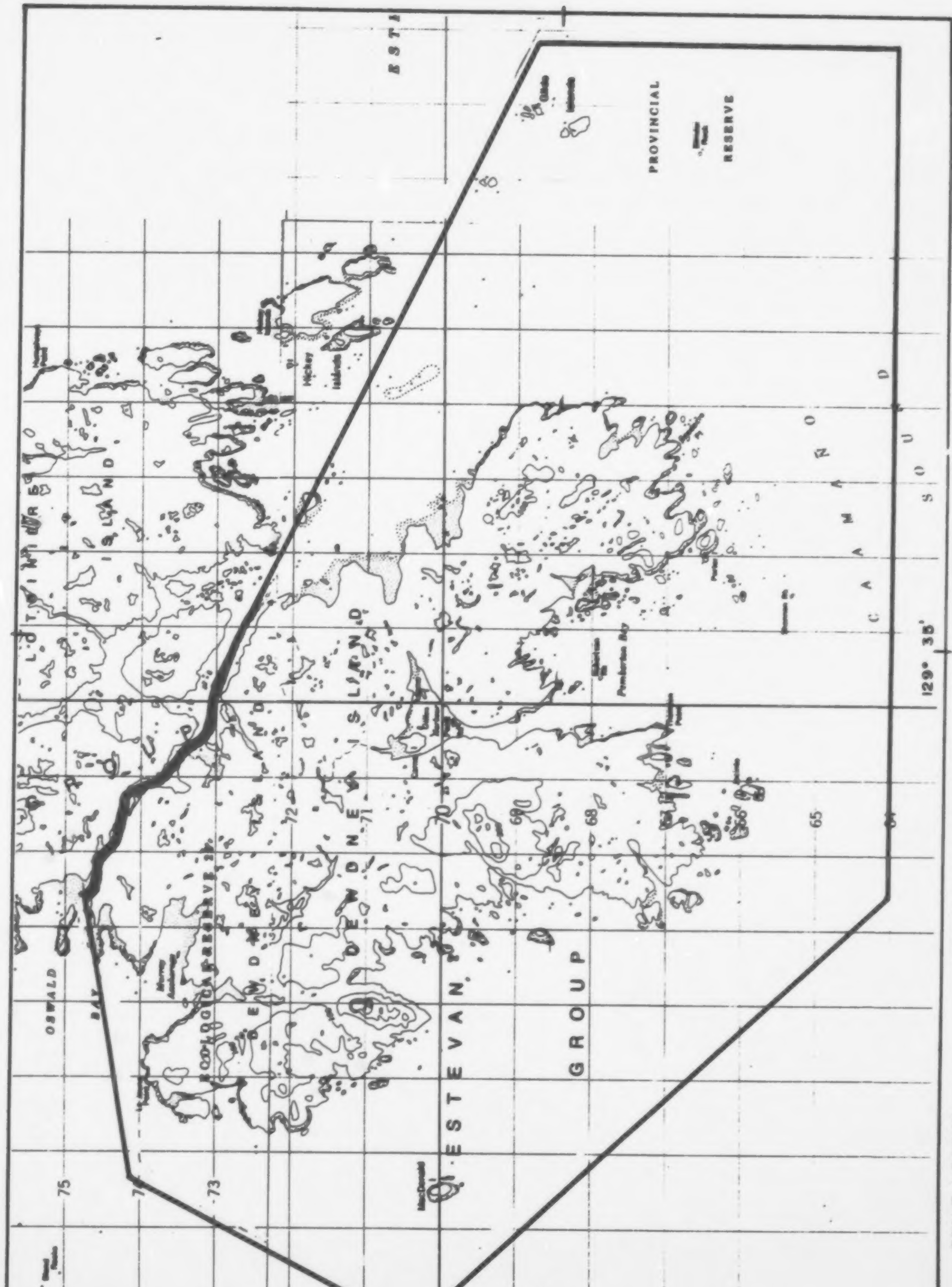
Most of the island has bedrock-controlled flat to undulating topography that does not exceed 50 m in elevation, however a few bedrock knobs on the western part of the island reach 100 - 130 m. Regional bedrock consists of a variety of intrusive rocks. Despite extensive glaciation, unconsolidated surficial materials are almost absent and soils are largely organic types formed by decaying plant material on the bedrock surface. Sands and gravels occur near the shoreline.

Many bog ponds, sloughs, and small lakes are scattered over Dewdney Island in flat areas and depressions, however drainage patterns are poorly organized and permanent streamcourses few and small. The maritime climate is characterized by frequent cloud cover, mist and fog, and by minimal seasonal variations in temperature.

BIOTIC FEATURES:

Dewdney Island is characterized by an outer rim of forest and interior area of wetland, the latter making up 60 to 75% of the total land area. Extensive occurrence of fen, bog and scrub vegetation, which occurs on both flat and gently sloping surfaces, is attributable to the subdued topography, moist climate, and lack of surficial materials conducive to development of forest soils. Forests are restricted to steep, well drained slopes and to a fringe near the shoreline where sands and gravels overlie the bedrock and nutrient supplies are better. Most of the forest cover consists of medium to small-diameter trees estimated at 80 to 100 years of age, evidently originating after a forest fire. Smaller remnants of much older trees are scattered, often on points and peninsulas.

On Dewdney Island, treeless fens dominated by tufted deer-grass and sweet gale are the wetland type of greatest areal extent. A less extensive fen community growing in standing water and dominated by Sitka sedge and sweet gale, contains few other plants. Throughout the fens, muddy


OSWALD
BAY
ESTEVAN GROUP
DEWDNEY ISLAND
ECOLOGICAL RESERVE 25
PROVINCIAL
RESERVE
Glide Islands
Hickey Islands
Pemberton Bay
CAAMANO SOUND
EST
75
73
72
71
70
69
68
65
64
52°58'
129° 35'

ECOLOGICAL RESERVE No.25
DEWDNEY AND GLIDE ISLANDS

SCALE 1:50000
N.T.S. No. 103 A/13, H/4

depressions a few meters across alternate with the raised, vegetated areas. The sparse plant cover in these depressions is characterized by beak-rush, a few other herbs, mosses, and the lichen Siphula ceratites. Two kinds of bogs have been identified, the first dominated by sphagnum mosses contains a few scattered shore pines, western redcedars, and yellow cedars of shrub stature; the second type is dominated by shore pines which typically cover one third to one half of the bog and reach 3 to 6 m in height. Shore pine scrub forest is also present.

Trees recorded in the reserve include western redcedar, western hemlock, Sitka spruce, yellow cedar, lodgepole (shore) pine, and western yew. To date 186 species of vascular plants, 31 mosses, 14 liverworts and 10 lichens have been identified in the reserve. Many of these are wetland species, ranking these fens and bogs among the most diverse of their type. Many plants here are restricted to bogs of the outer coast. At least 13 species of higher plants in the reserve are considered by experts to be rare in the province, including beach lovage (Ligusticum scoticum subsp. hultenii), Calder's lovage (Ligusticum calderi) which is also endemic to British Columbia, Queen Charlotte ragwort (Senecio moresbiensis), common scurvy-grass (Cochlearia officinalis), Alaskan harebell (Campanula alaskana), Gmelin's sedge (Carex gmelinii), few-flowered spike-rush (Eleocharis quinqueflora), Covilles' rush (Juncus covillei), marsh peavine (Lathyrus palustris), Chamisso's rein orchid (Platanthera chorisiana), bog adder's-mouth orchid (Hammarbya paludosa), and Alaska plantain (Plantago macrocarpa).

Typical of such isolated islands, the mammal fauna is sparse. However black-tailed deer, wolves, beaver, river otters, mink, deer mice and dusky shrews have managed to invade since the melting of Pleistocene glaciers. Beaver are instrumental in maintaining some of the wetlands. The avifauna is more diverse, though not thoroughly surveyed. Noteworthy nesting species are the Canada goose, sandhill crane, and Lincoln's sparrow. Only a few nesting sites of the sandhill crane are known in British Columbia. Other birds noted in the reserve include the common and red-throated loon, red-breasted merganser, great blue heron, blue grouse, band-tailed pigeon, bald eagle, Cooper's hawk, goshawk, sanderling, dunlin, raven, winter wren, hermit thrush, American robin, and junco. A colony of the burrow-nesting Cassin's auklet is present on Glide Islands.

OUTSTANDING FEATURES: Extensive, diverse, coastal bogs and fens containing several rare plants; a very isolated beaver population; wetland birds having a restricted breeding range in the province; a breeding colony of Cassin's auklet.

OTHER INFORMATION: Order-in-Council no. 1587, 4 May 1971. Application no. 58. Map no. 103 A/13; H/4. Marine chart no. 3724. Accessible by boat, helicopter, or float plane but closed to the public by Order-in-Council (no. 1920, 16 June 1977) to protect nesting birds and their habitat. Safe moorage is available in Gillen Harbour.

Despite boggy terrain and wet climate there is evidence that the vegetation has historically been affected by fire.

A preliminary plant list and a report on bog and fen plant communities are available.

Marine waters are not included in the reserve.

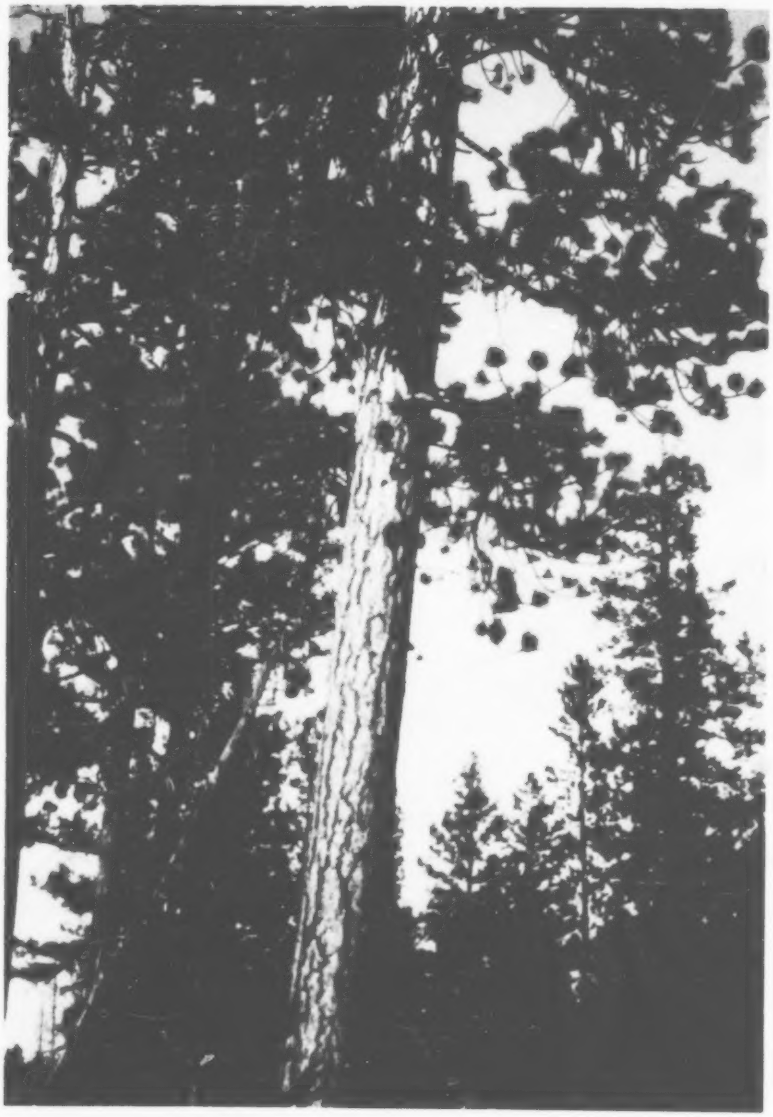


Figure 4. Protection of Genetic Diversity in the Chasm Ecological Reserve (#65)

Representative as well as outstanding natural ecosystems reflect the great biological diversity found in the landscapes of British Columbia. The Chasm Reserve (#65) near Clinton protects a dry Douglas fir/lodgepole pine forest typical of the area. However, this reserve also protects a significant gene pool in terms of forestry as it contains one of the most northerly distributed stands of large Ponderosa pine. (Photo V. Krajina)

RAM CREEK

E.R. #26

PURPOSE: Protection of hotsprings and very restricted plant communities and rare plants against recreational and other damage

LOCATION: 20 km SE of Canal Flats

SIZE: 121 ha LAT: 50°02'N LONG: 115°36'W ELEVATION: 1370 - 1615 m

BIOGEOCLIMATIC ZONES: Interior Douglas Fir; Montane Spruce

PHYSICAL FEATURES:

A major feature of this reserve is its natural hotspring, located in Ram Creek valley near the confluence of Marmalade Creek. The reserve is located on the west side of the Hughes Range, a north - south series of jagged peaks reaching 2500 m in height. It straddles Ram Creek which flows westward to join the Lussier River. Soils are largely Brunisols on colluvial and morainal deposits derived from calcareous parent materials.

BIOTIC FEATURES:

The most unique vegetation is that immediately surrounding the hotsprings and along streamsides below the springs. This tends to develop much earlier in the spring than other vegetation only a few meters away, to be very lush, and to contain species that, in this region, are only able to survive in such an environment. Common plants in the herbaceous community at the hotsprings are poison ivy, bluegrasses, and field mint. Also present are white geranium, Kalm's lobelia, Canadian butterweed, leafy aster, slender rush, and the rare sedge Carex crawei.

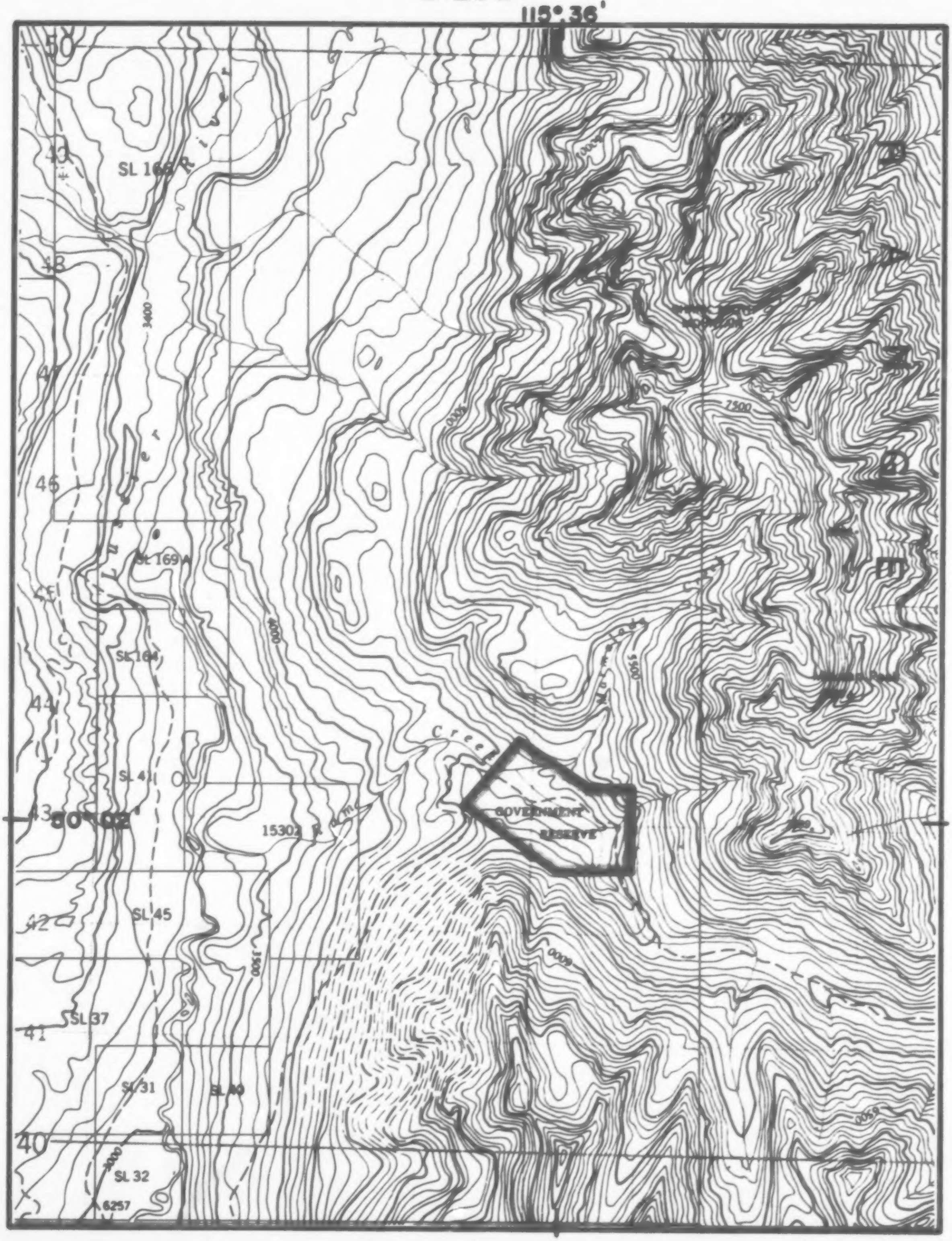
A variety of trees is present but Douglas fir and/or lodgepole pine are dominant in most areas. Douglas fir - trembling aspens stands in which common juniper, kinnikinnick, and pinegrass characterize the understory, occur on dry south-facing slopes, while lodgepole pine - Douglas fir woods with understory dominants like birch-leaved spirea, soopolallie, and pinegrass occur on morainal material. Moist valley bottoms and north-facing slopes support mixed Douglas fir - Engelmann spruce - western larch stands.

Mule deer, white-tailed deer, elk, and bighorn sheep inhabit this area. Birds noted include kinglets, fox and chipping sparrows, juncos, chickadees, nuthatches, winter wrens, varied thrushes and ruffed grouse.

OUTSTANDING FEATURES: Hotsprings and associated plant communities containing plants that are rare or outside their usual distribution range.

OTHER INFORMATION: Order-in-Council no. 2721, 29 July 1971. Application no. 47. Map no. 82 J/4. Access from Highway 95 via Lussier River Road.

The reserve has been subjected to considerable disturbance. Parts of the area have been selectively logged, and much of it was burned in a 1985 forest fire. Bulldozed firebreaks caused additional damage. Weeds are extensive in these disturbed sites. A gravel pit, parking area and primitive campsite are present. The pools have been enlarged by blasting.


115°36'
50
49
SL 168
48
47
46
45
SL 169 A
SL 164
44
Creek
SL 41
43
50°02'
15302
GOVERNMENT
RESERVE
42
SL 45
41
SL 37
SL 31
SL 40
40
SL 32
6257
4000
3500
7500

SCALE 1:50 000

1 0 1 2 3 4 km

N.T.S. No. 82 J/4

ECOLOGICAL RESERVE No. 26
RAM CREEK

WHIPSAW CREEK

E.R. #27

PURPOSE: To maintain representative stands of ponderosa pine and Douglas fir in the Interior Douglas Fir Zone

LOCATION: 10 km SSW of Princeton

SIZE: 32 ha LAT: 49°23'N LONG: 120°35'W ELEVATION: 930 - 990 m

BIOGEOCLIMATIC ZONE: Interior Douglas Fir

PHYSICAL FEATURES:

The reserve is located near the dissected southwestern edge of the Thompson Plateau in the Similkameen River watershed. Regional soils are predominantly developed on glacial drift. The reserve staddles a low east-west oriented ridge and so has both southerly and northerly exposed slopes. Mean annual precipitation is expected to be only slightly higher than the 36 cm recorded at Princeton. This results in a moderately severe soil moisture deficit in summer.

BIOTIC FEATURES:

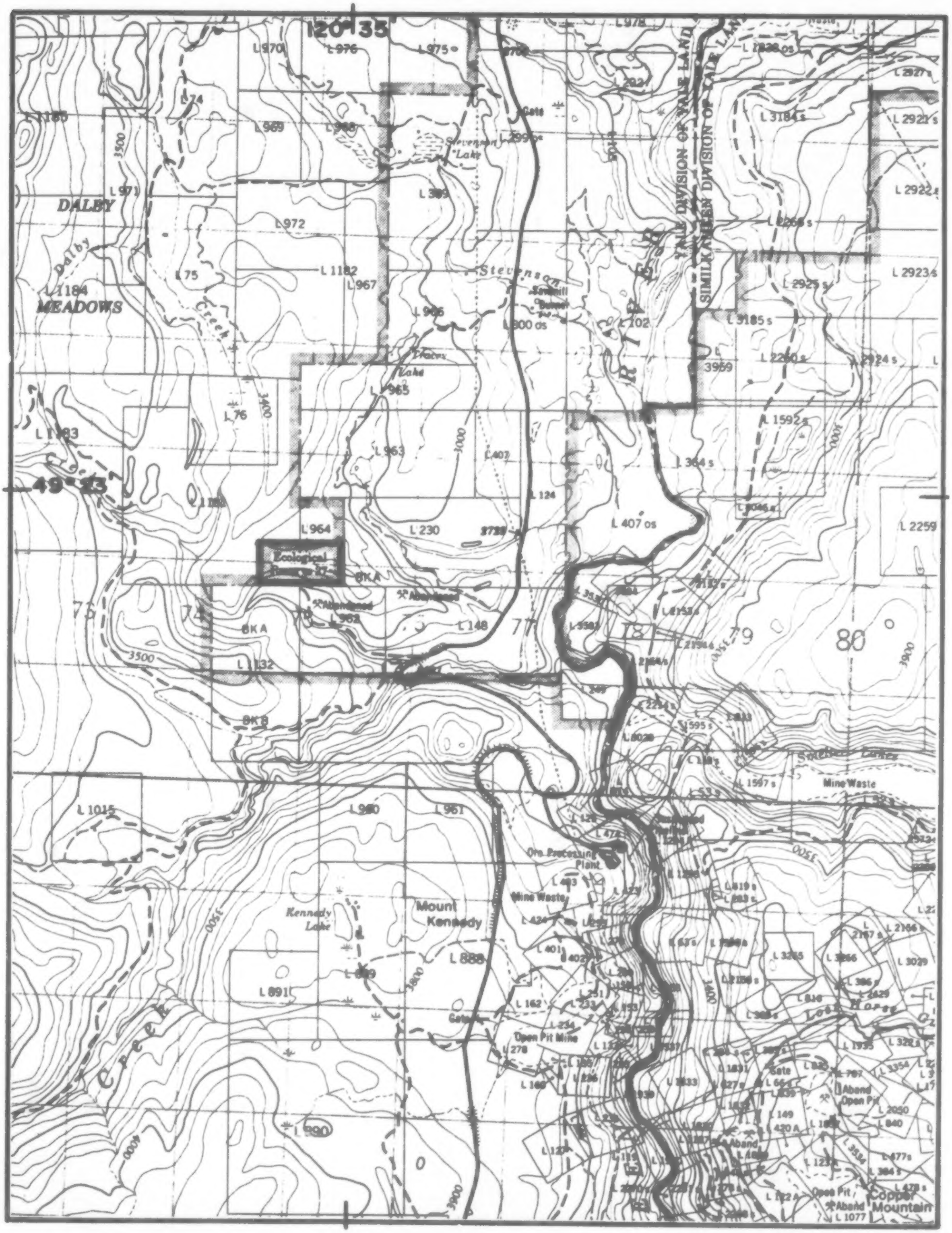
Variations in aspect and soil texture result in communities ranging from open grassland to fairly dense forest. Patches of grassland on the lower south slope have been heavily grazed and are dominated by big sage and seral grasses such as Sandberg's bluegrass which have replaced the normal climax dominant, bluebunch wheatgrass. Typical forbs in this type are sagebrush buttercup, western springbeauty, sticky cinquefoil, western groundsel, and rosy pussytoes. The upper south-facing slope supports well-spaced stands of ponderosa pine and Douglas fir in which big sage is the dominant shrub and bluebunch wheatgrass the characteristic grass. Rocky Mountain and common juniper, junegrass, arrow-leaved balsam-root, diffuse knapweed, and kinnikinnick also occur on these slopes. The crest of the ridge supports vegetation transitional between the south and north slopes. Predominant species are ponderosa pine, Douglas fir, and pinegrass; other plants include Saskatoon, prickly rose, balsam-root, and lomatium. On the north slope of the ridge the forest is made up almost entirely of a dense stand of Douglas fir, and pinegrass dominates the understory.

Elk and mule deer are common in the area, particularly in winter and spring. Typical birds noted here are the mountain bluebird, Townsend's solitaire, mountain chickadee, pygmy nuthatch, American kestrel, magpie, northern flicker, Williamson's sapsucker, Clark's nutcracker, and blue grouse.

OTHER INFORMATION: Order-in-Council no. 2722, 29 July 1971. Application no. 63. Map no. 92 H/7. Access by 1.5 km walk from Highway 3 at Whipsaw Creek bridge.

Herbaceous vegetation has been much influenced by livestock grazing; forest stands to a lesser extent by fire and selective logging. Some exotic weeds have invaded, largely as a result of extensive livestock use.

2-27B


120°35'
49°23'
DALBY
MEADOWS
Dalby
Creek
Stevenson Lake
Stevenson
Sawmill
Tracey Lake
Ecological Reserve 27
BKA
BKB
Abandoned
YALE DIVISION OF YALE LAND
SIMILKAMEEN DIVISION OF YALE LAND
Gate
Mine Waste
Ore Processing Plant
Kennedy Lake
Mount Kennedy
Open Pit Mine
Creek
Lost Horse
Aband Open Pit
Open Pit
Copper Mountain
73
74
75
77
78
79
80
3500
3900
4000
L 970
L 976
L 975
L 969
L 968
L 971
L 972
L 1182
L 967
L 1184
L 1183
L 966
L 965
L 963
L 964
L 962
L 230
L 148
L 1132
L 1015
L 960
L 961
L 891
L 889
L 888
L 890
L 3184 s
L 2921 s
L 2922 s
L 2923 s
L 2925 s
L 2924 s
L 2260 s
L 3185 s
L 3959
L 1592 s
L 364 s
L 407 os
L 2259
L 1077
1
0
1
2
3
4 km

SCALE 1·50000

N.T.S. No. 92 H/7

ECOLOGICAL RESERVE No. 27
WHIPSAW CREEK

AMBROSE LAKE

E.R. #28

PURPOSE: To preserve a small coastal lake, adjacent bogland, and surrounding forest

LOCATION: Sechelt Peninsula, 5 km SW of Earl's Cove

SIZE: 228 ha LAT: 49°44'N LONG: 124°01'W ELEVATION: 0 - 215 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

The reserve occurs on undulating terrain of the Georgia Lowland, underlain by largely granitic bedrock. Its western boundary follows 1.5 km of marine shoreline along Agamemnon Channel, its eastern boundary a similar distance along the western edge of Ruby Lake. Soils are predominantly Podzols on glacial till, except for bedrock exposures and boggy areas. Ambrose Lake is located entirely within the reserve, as is most of its rather limited watershed. The lake is 30 ha in area, 33 m deep, and irregular in shape. It drains eastward into Ruby Lake.

BIOTIC FEATURES:

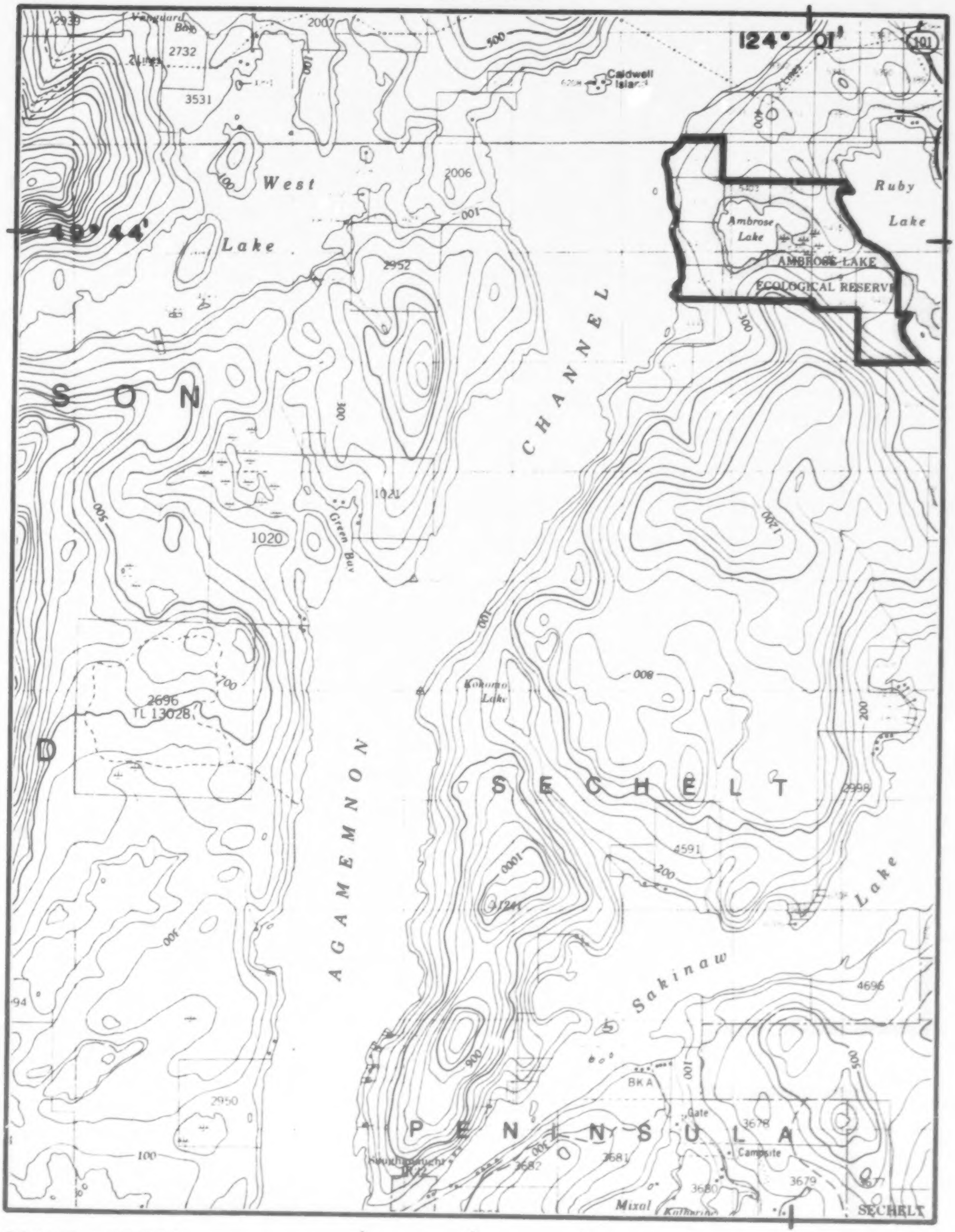
Most of the reserve area consists of upland forest in which Douglas fir and western hemlock are abundant. Western redcedar may be locally common, while western white pine, arbutus, bigleaf maple, flowering dogwood, and cascara occur more sparingly. Typical upland associations include Douglas fir - salal-moss; western hemlock - Douglas fir - moss; and western red cedar - Douglas fir - sword fern. Additional trees recorded in moist and riparian situations are lodgepole pine, red alder, Sitka spruce, and Pacific crab apple.

Interesting boglands, of limited extent in his part of the province, occur along the northern margin of Ambrose Lake and along its outlet stream, southeastward from the eastern bulge of the lake. These are characterized by scattered lodgepole pine trees, shrubs such as Labrador tea, sweet gale, and bog-laurel, sedges, and sphagnum moss. The yellow waterlily occurs in shallow bays around the lake edge. Interesting rare plants recorded here are the Vancouver groundcone (Boschniakia hookeri) and "common" reed (Phragmites australis). Twenty three species of mosses, six of liverworts, and six of lichens have been recorded.

The fauna has not been surveyed, but beaver are known to be present. Prickly sculpins are present in the lake. There is no record of Ambrose Lake ever having been stocked with sport fish.

OTHER INFORMATION: Order-in-Council no. 2817, 13 August 1971; 3282, 14 September 1971 (land exchange); 3584, 5 October 1971 (amendment of O.I.C. 3282). Application no. 12. Map no. 92 F/9. Access by rough road south from Earl's Cove, by boat across Ruby Lake from Highway 101, or by boat along Agamemnom Channel.

Some logging has occurred in the reserve but the lakeshore area is in a natural state. Plant lists are available.


124° 01'
49° 44'
101
Vanguard Bay
Caldwell Island
West Lake
Ruby Lake
Ambrose Lake
AMBROSE LAKE ECOLOGICAL RESERVE
CHANNEL
SON
D
AGAMEMNON
Green Bay
Kokomo Lake
SECHELT
PENINSULA
Sakinaw Lake
TL 13028
Gate
Campsite
Mixal
Katherine
SECHELT
2939
2732
3531
2007
2006
2952
1021
1020
2696
2998
4591
4696
2950
3678
3681
3682
3679
3680
3677
BKA
500
100
700
800
1200
200
1000
900

SCALE 1:50000

1 0 1 2 3 4 km

N.T.S. No. 92 F/9

ECOLOGICAL RESERVE No. 28
AMBROSE LAKE

TRANQUILLE E.R. #29

PURPOSE: Preservation of representative ponderosa pine and Douglas fir ecosystems in a prominent interior valley

LOCATION: 20 km WNW of Kamloops, N side of Kamloops Lake

SIZE: 235 ha LAT: 50°45'N LONG: 120°34'W ELEVATION: 610 - 1160 m

BIOGEOCLIMATIC ZONES: Ponderosa Pine; Interior Douglas Fir

PHYSICAL FEATURES:

This reserve, located on the north side of the Thompson River valley, has two distinct landforms. Its northeastern half consists of steep, gullied slopes which drop away sharply from the Red Plateau to the north. These have much exposed bedrock, talus, and colluvial material; soils, where developed, are Regosols. Below this escarpment are gently sloping fans of colluvial materials derived from glacial till on which Chernozemic soils have developed. Exposure is to the south and southwest. The climate is characterized by cold winters (mean daily January temperature -6°C) hot summers (mean daily July temperature 21°C) and little precipitation (mean 26 cm annually).

BIOTIC FEATURES:

The reserve is largely forested although tree cover is sparse in many areas due to aridity and/or lack of soil. Small areas of treeless grassland occur along its lower fringe, some of which have been modified by cultivation. Remaining natural grasslands are dominated by big sage, Sandberg's bluegrass, and needle-and-thread grass. Most of the gently sloping part of the reserve is covered by a ponderosa pine - bluebunch wheatgrass community having a sparse shrub layer comprised mainly of rabbitbush and big sage. Above about the 760 m elevation, a Douglas fir - ponderosa pine - bluebunch wheatgrass community is present. Here, bluebunch wheatgrass is still dominant in the herb layer but the clumps are smaller and more widley spaced.

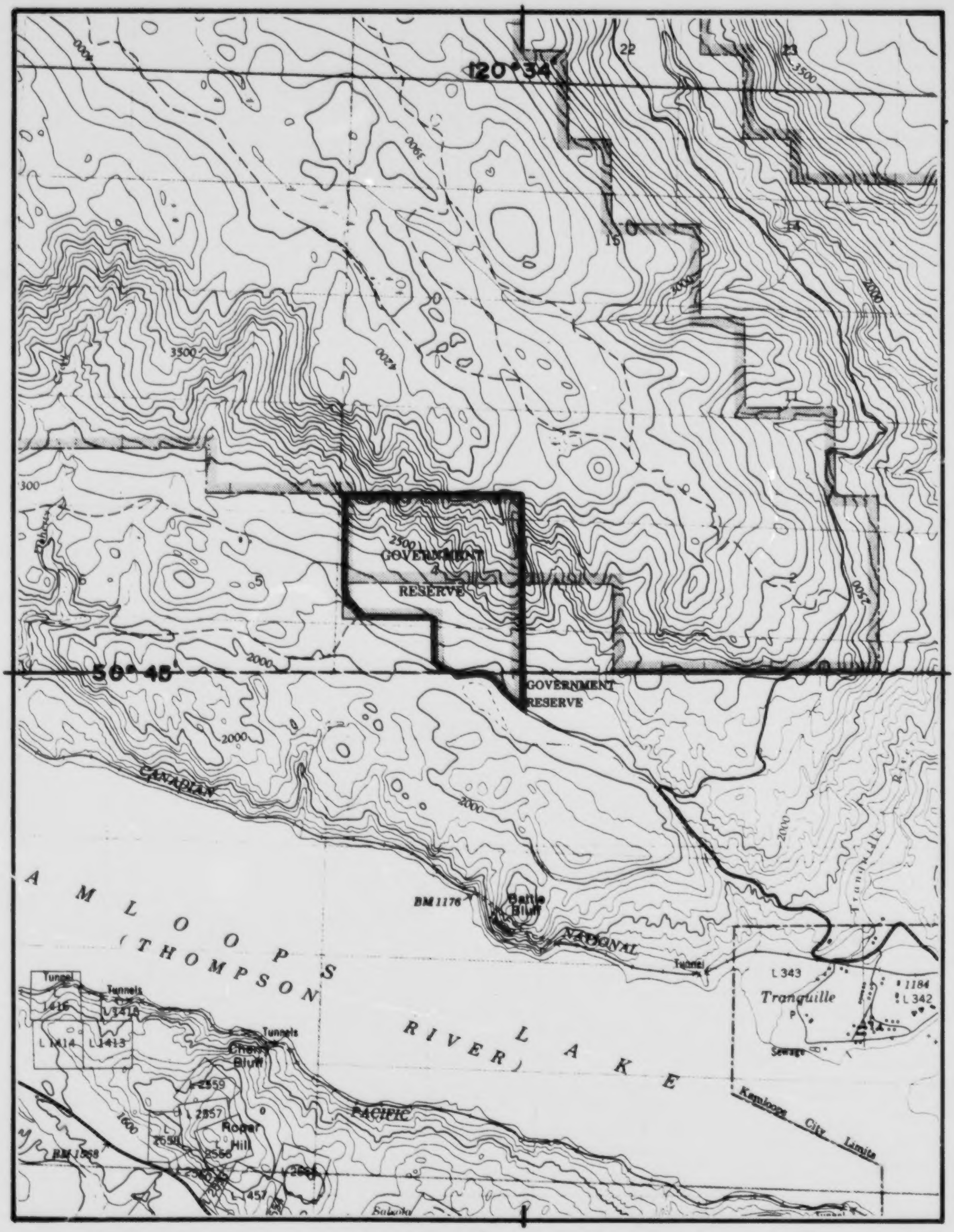
Sixty-nine species of vascular plants have been recorded, of which western fairy-candelabra (Androsace occidentalis), Dalles milk-vetch (Astragalus sclerocarpus), trailing fleabane (Erigeron flagellaris), slender plantain (Plantago elongata) and gray horsebrush (Tetradymia canescens) are considered rare in British Columbia.

Wildlife surveys have not been carried out, although two snakes (rattlesnake and bullsnake) are known to occur, and the area provides important winter range for mule deer and bighorn sheep.

OTHER INFORMATION: Order-in-Council no. 3684, 12 October 1971, and 3992, 4 November 1971 (ammendment). Application no. 55. Map no. 92 I/10; I/15. Access by road from Tranquille.

The flat part of the reserve has been moderately to heavily grazed by livestock for many years and this has probably influenced plant cover. Some grazing continues.

One masters thesis has been prepared on reserve vegetation.


120°34'
50°45'
GOVERNMENT RESERVE
GOVERNMENT RESERVE
22
23
15
14
2
3500
4000
3000
2500
2000
300
CANADIAN
NATIONAL
PACIFIC
KAMLOOPS (THOMPSON RIVER) LAKE
BM 1176
Battle Bluff
Tunnel
L 343
Tranquille
L 1184
L 342
Sewage
Kamloops City Limits
Tunnel
Tunnels
L 1416
L 1418
L 1414
L 1413
Tunnels
Cherry Bluff
L 2559
L 2557
Roper Hill
L 2558
L 2556
L 2560
L 1457
1600
BM 1558

SCALE 1:50000

1 0 1 2 3 4 km

N.T.S. No. 92 I/10,15

ECOLOGICAL RESERVE No. 29
TRANQUILLE

VANCE CREEK E.R. #30

PURPOSE: Provision of a permanent site in the Vernon region for teaching forest ecology and related subjects

LOCATION: 6 km N of Lumby

SIZE: 49 ha LAT: 50°18'N LONG: 118°57'W ELEVATION: 640 - 700 m

BIOGEOCLIMATIC ZONE: Interior Douglas Fir

PHYSICAL FEATURES:

The reserve lies in an area of rolling mountains known as the Shushwap Highland, along the eastern edge of the Interior Plateau. The level slopes gently downward from the east and west boundaries toward Vance Creek which flows to the south in a shallow ravine through its central area. Immediately below the reserve the creek valley is canyon-like. Mountains on each side of the reserve rise to the 1200 - 1800 m level. Annual precipitation is reported to be about 55 cm.

BIOTIC FEATURES:

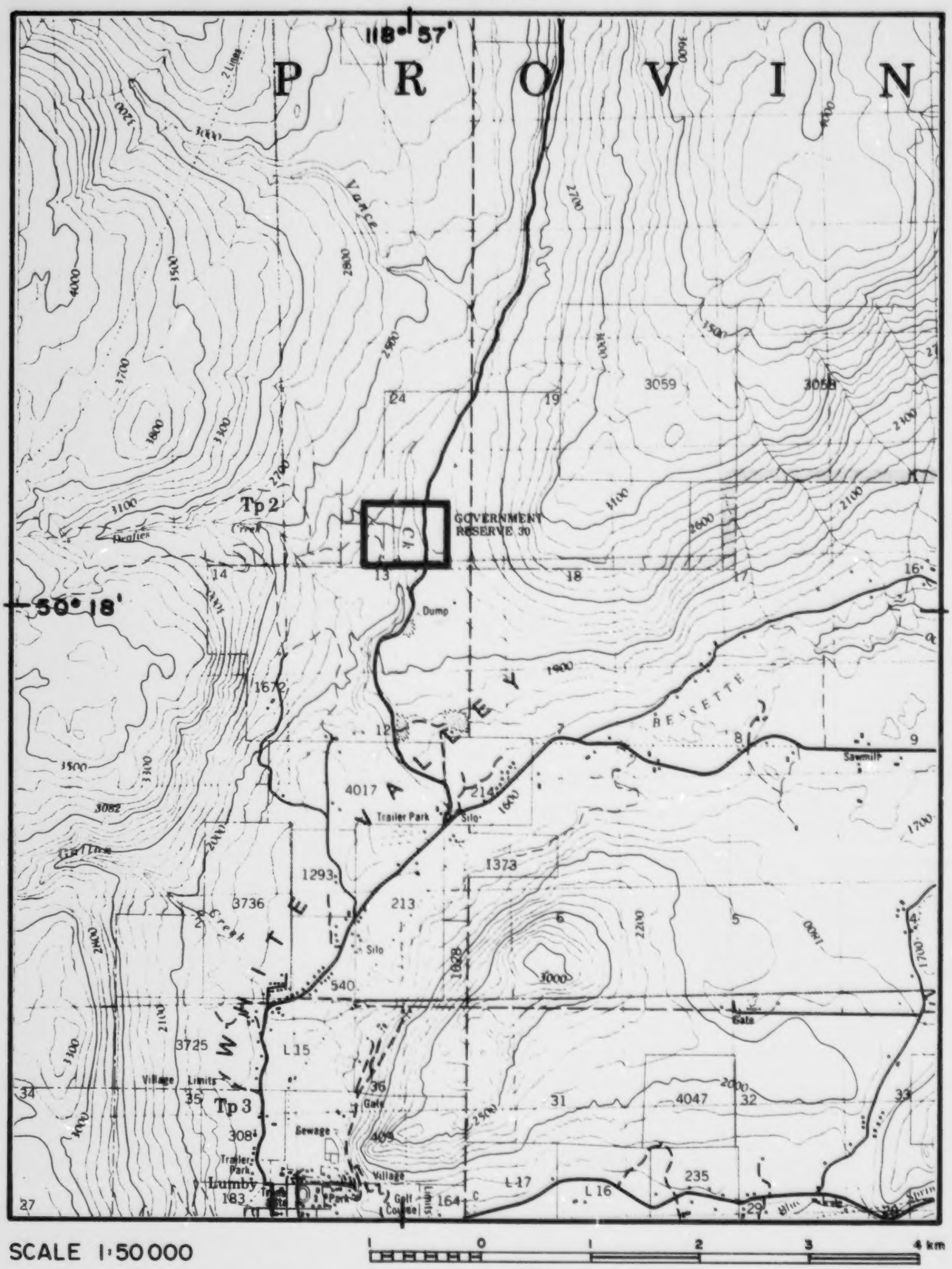
This reserve was logged about 1930 and now supports advanced second growth forest dominated by Douglas fir over most of its area. Two Douglas fir communities have been recognized, one characterized by falsebox and prince's pine, the other by bunchberry and queen's cup. Seepage supplies water to two small swamp - forest stands which extend downslope to Vance Creek. These are dominated by western redcedar, skunk cabbage, lady fern, and horsetails. Adjacent sites with slightly less moisture support cedar - Engelmann spruce stands in which wild sarsaparilla characterizes the understory. A similar forest type in which hazelnut is common in the understory has been noted in alluvial sites. Other trees in the reserve include western larch and western white pine.

The fauna has not been surveyed.

OTHER INFORMATION: Order-in-Council no. 466, 7 February 1972. Application no. 88. Map no. 82 L/7. Access via the Trinity Valley Road north of Lumby, which passes through the reserve. The road allowance is not part of the reserve.

Prior to 1970 the reserve was used for forest entomology research by Agriculture Canada. It is now used extensively by schools in the Vernon district as an outdoor classroom for education in natural science. A parking area and picnic shelter are present, as well as maintained trails, interpretive signs, and some fencing. Old logging roads are evident on air photos of the area.

Nearby lands, especially to the south, have been much disturbed by logging, agricultural clearing, grazing, and gravel extraction.


118° 57'
P R O V I N
Vance
GOVERNMENT RESERVE 30
Ck
Tp 2
50° 18'
Dump
BESSETTE
Sawmill
Trailer Park
Silo
VALLEY
WHITE
Gate
Village Limits
Tp 3
Sewage
Trailer Park
Lumby
Golf Course
3059
3058
4017
1293
3736
213
1373
3725
L 15
L 17
L 16
31
4047
32
33
235
164
183
308
309
36
35
34
27
540
1628
1672
214
24
19
13
14
18
17
16
12
7
8
9
6
5
29
3082

SCALE 1:50 000

1 0 1 2 3 4 km

N.T.S. No. 82 L/7

ECOLOGICAL RESERVE No. 30
VANCE CREEK

LEW CREEK E.R. #31

PURPOSE: Protection of a complete watershed containing an elevational sequence of three biogeoclimatic zones in a wet interior environment

LOCATION: SW side of Trout Lake 35 km E of Upper Arrow Lake

SIZE: 815 ha LAT: 50°32'N LONG: 117°27'W ELEVATION: 790 - 2,500 m

BIOGEOCLIMATIC ZONES: Interior Cedar - Hemlock; Engelmann Spruce - Subalpine Fir; Alpine Tundra

PHYSICAL FEATURES:

Mount Hadow and adjacent serrate peaks of the Slocan Ranges mark the upper-elevational southwest boundary of the reserve and provide a spectacular backdrop. Below the vertical headwalls of this peak is a prominent cirque basin containing an alpine glacier which feeds directly into a subalpine lake, the source of Lew Creek. Reserve boundaries enclose the entire rather narrow valley of Lew Creek, a turbulent mountain stream which flows northeast into Trout Lake. Rock and talus are widespread in the alpine zone, as are avalanche chutes in the subalpine forest.

BIOTIC FEATURES:

The reserve spans three biogeoclimatic zones. Below about the 1450 m elevation, western hemlock - western redcedar - western yew forest is quite continuous, and characterized by one-leaved foamflower and oak fern in the understory. Smaller, richer lowland sites support cedar stands in which devil's club, false-Solomon's seal, and lady fern are typical. Subalpine forests are extensive but broken into ribbons by many avalanche paths, particularly in the upper part of the valley. In the lower, more continuous Engelmann spruce - subalpine fir stands, either white rhododendron and queen's cup or white rhododendron and black huckleberry are dominant species in the understory. Toward timberline, subalpine fir is more abundant than spruce, tree growth is more patchy and stunted, and whitebark pine, white rhododendron and blue-leaved huckleberry are frequent associated species.

Although a sizeable area is within the alpine zone, much of this consists of cliffs, talus, ice, and snow.

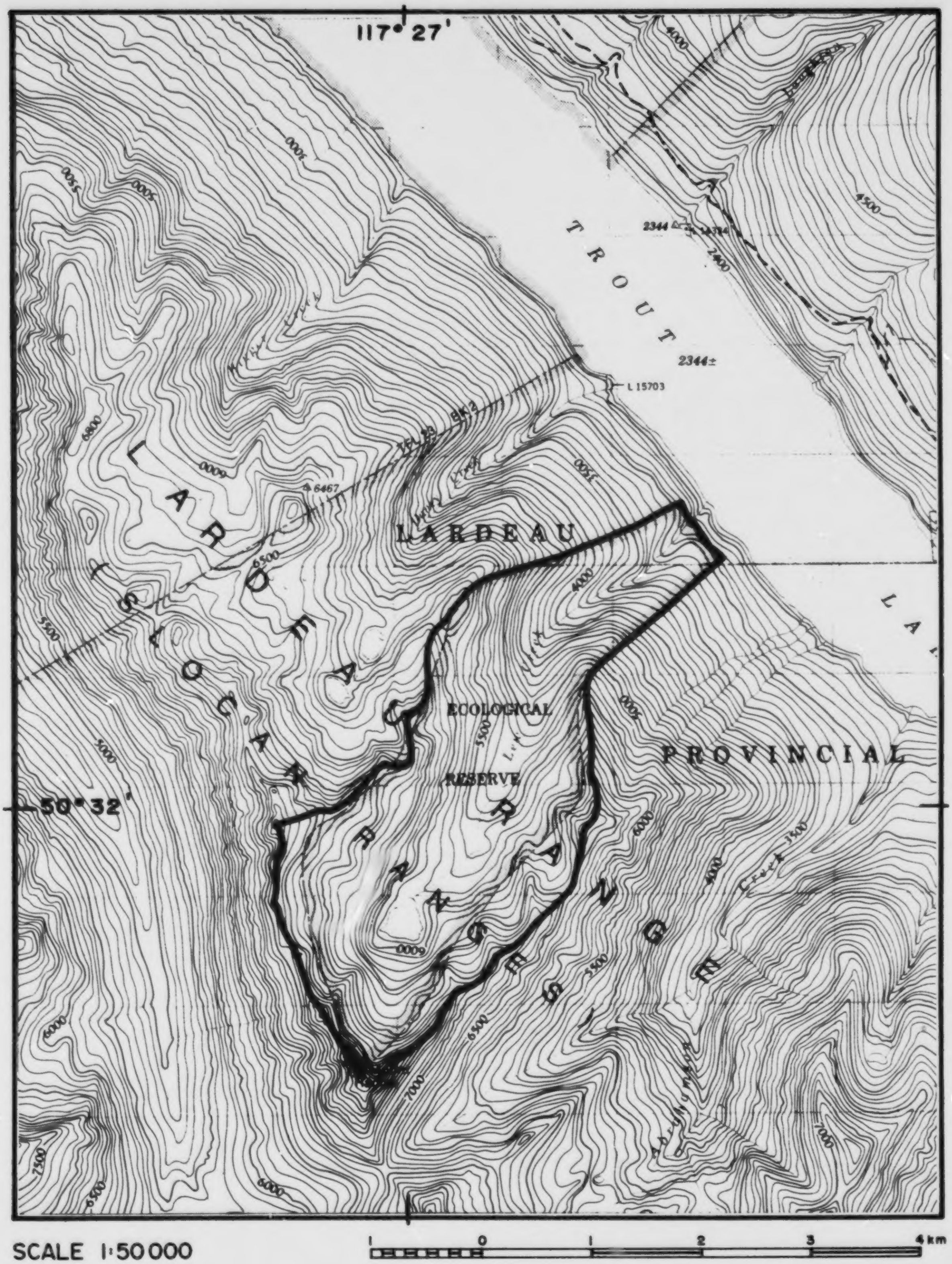
The fauna has not been surveyed. Habitat capability for ungulates is generally low due to deep snow, however, a few mountain goats and caribou inhabit the area.

OUTSTANDING FEATURES: An elevational sequence of three biogeoclimatic zones within a complete watershed make this an important benchmark reserve.

OTHER INFORMATION: Order-in-Council no. 902, 8 March 1972. Application no. 65. Map no. 82 K/11. Access by boat on Trout Lake.

The reserve is in a completely natural state.

2-31 B


117° 27'
50° 32'
TROUT
LARDEAU
LARDEAU RANGE
SLOCAN RANGE
ECOLOGICAL RESERVE
PROVINCIAL
LA
Lew
Creek
L 15703
2344±
6467
4000
4500
5000
5500
6000
6500
7000
1 0 1 2 3 4 km

SCALE 1:50000

N.T.S. No. 82 K/11

ECOLOGICAL RESERVE No. 31
LEW CREEK

EVANS LAKE E.R. #32

PURPOSE: To reserve one of the few known stands of yellow cedar in interior British Columbia for future research

LOCATION: Head of Evans Lake, 18.5 km NW of Slocan

SIZE: 185 ha LAT: 49°52'N LONG: 117°42'W ELEVATION: 1525 - 2625 m

BIOGEOCLIMATIC ZONES: Engelmann Spruce - Subalpine Fir; Alpine Tundra

PHYSICAL FEATURES:

The spectacular and rugged Valhalla Ranges of the Selkirk Mountains are the location of this reserve. The area was heavily glaciated by Pleistocene ice sheets and more recent alpine glaciers, resulting in deep steep-sided valleys and angular peaks with sharp narrow interconnecting ridges. The reserves is entirely on a steep (45°) south-facing slope at the west end of Evans Lake. There is considerable exposed bedrock at higher elevations, as well as talus and colluvium at all elevations. Soil cover is thin and discontinuous. Snow avalanches are frequent and affect the entire elevational range of the reserve.

BIOTIC FEATURES:

The occurrence here of yellow cedar is of considerable interest because this species, common in coastal subalpine forests, occurs in very few interior locations. Specimens here occur from near the Evans Lake shoreline to the 2130 m level, and sometimes form dense enough stands to be a community dominant. Yellow cedar may also be a sub-dominant species in adjacent Engelmann Spruce - Subalpine fir - falsebox communities. Typical spruce - Subalpine fir forest, mostly found on lower slopes near Hird Creek, may have an understory characterized by either devil's club and Sitka valerian, or by white rhododendron and black huckleberry. A small relatively wet area beside lower Hird Lake has scattered spruce trees with an understory of bog laurel, sedges, and sphagnum moss. Shrubby avalanche slopes cover large areas; typical components are Sitka alder, black gooseberry, red elderberry, and Sitka valerian.

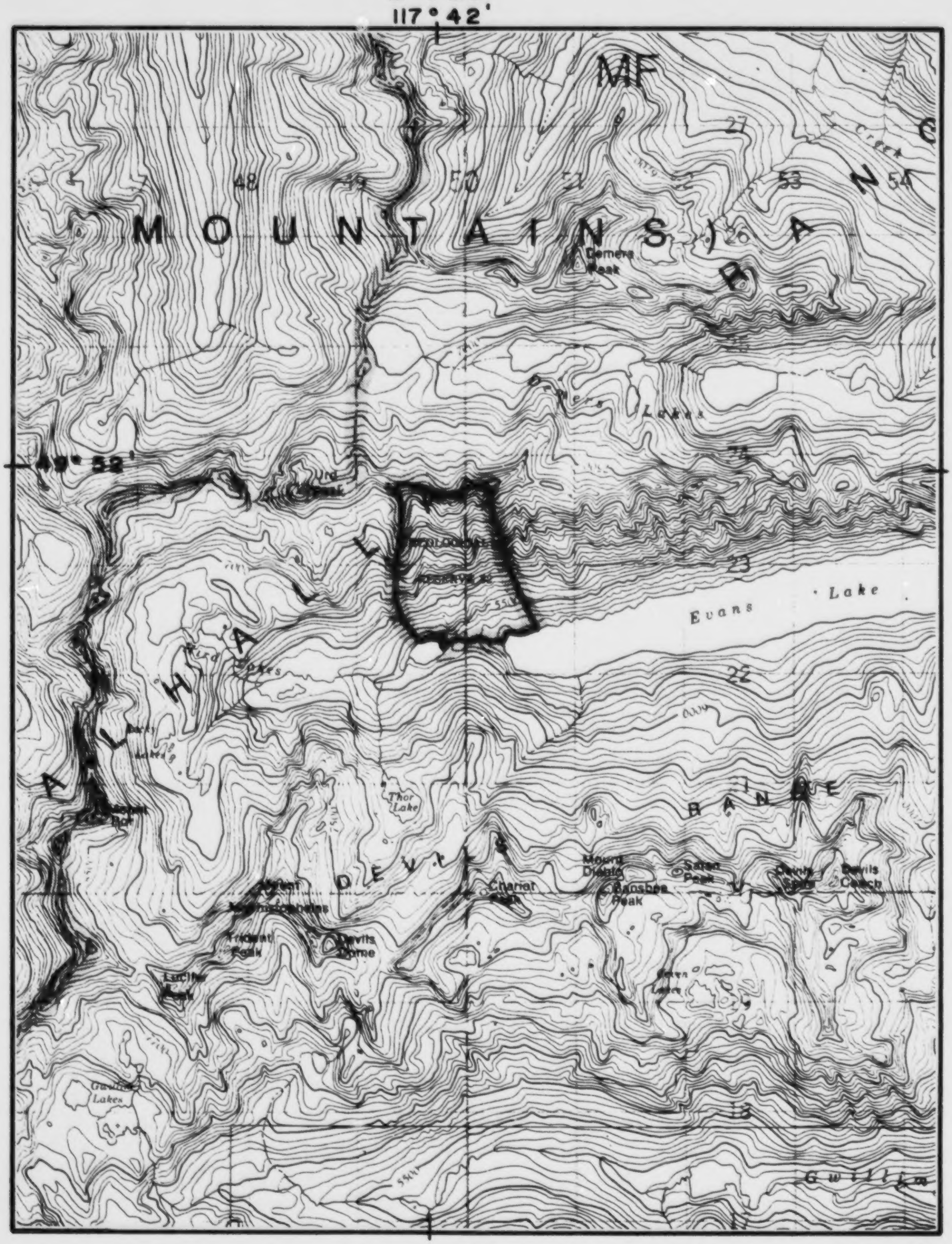
Alpine communities within the reserve have not been described but are limited in extent due to steep unstable terrain and extensive bedrock.

The fauna has not been surveyed, but signs of pikas and mountain goats have been noted.

OUTSTANDING FEATURES: Contains one of very few stands of yellow cedar in interior British Columbia, and probably the best example.

OTHER INFORMATION: Order-in-Council no. 903, 8 March 1972. Application no. 64. Map no. 82 F/13. The only practical access is by helicopter or float-plane. Due to frequent avalanches the reserve is unsafe for casual or inexperienced visitors. The reserve is within Valhalla Provincial Park.

2-32B


117°42'
49°52'
MOUNTAINS
VALHALLA
DEVILS
RANGE
Geneva Peak
Creek
Lakes
ECOLOGICAL RESERVE 32
Evans Lake
Thor Lake
Chariot Peak
Mount Diablo
Banshee Peak
Satan Peak
Devils Spire
Devils Couch
Devils Dome
Lucifer Peak
Gwillim Lakes
Gwillim
48
50
53
54
27
26
23
22
18

SCALE 1:50000

1 0 1 2 3 4km

N.T.S. No. 82 F/13

ECOLOGICAL RESERVE No. 32
EVANS LAKE

FIELD'S LEASE E.R. #33

PURPOSE: To protect a small sample of the most arid shrub-steppe ecosystems in Canada

LOCATION: S Okanagan Valley, W of N end of Osoyoos Lake

SIZE: 4.2 ha LAT: 49°04'N LONG: 119°31'W ELEVATION: 335 m

BIOGEOCLIMATIC ZONE: Bunchgrass

PHYSICAL FEATURES:

Rocky knolls thinly covered with sandy soil form the central axis of this reserve. These are bordered by sandy flats on their west and south sides, and a steep northeast-facing slope along the northeasterly boundary. A small draw containing an intermittent stream occurs in the extreme northwestern corner of the reserve. Aridity is accentuated on parts of this site which have shallow and/or sandy soils.

BIOTIC FEATURES:

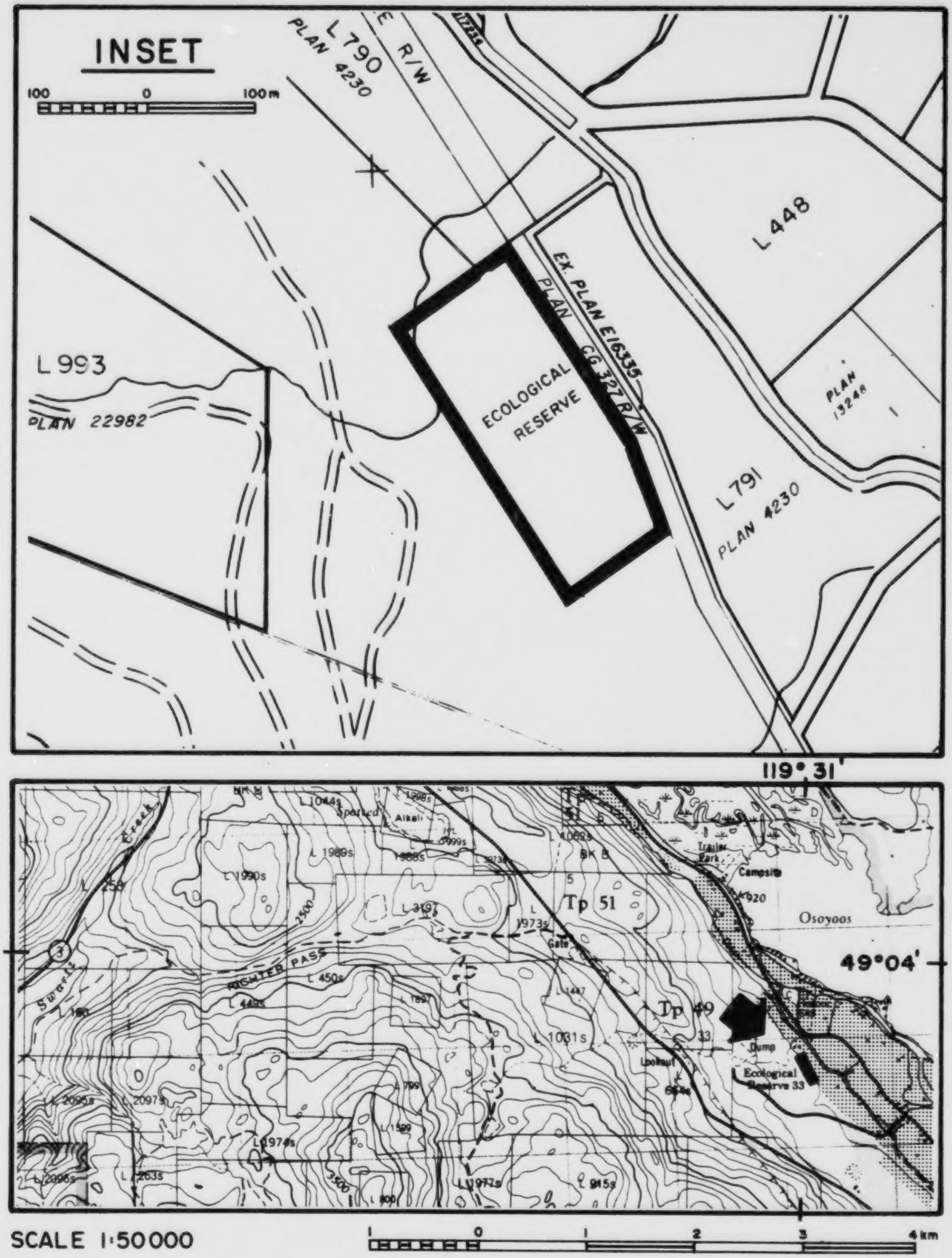
The natural vegetation here represents the northern extreme of the Upper Sonora Life Zone which extends from northern Mexico to the southern Similkameen and Okanagan valleys in British Columbia. Both shrub - grassland and grassland communities are present; trees are absent. Plant communities present are the antelope brush - bluebunch wheatgrass type on sandy areas around the knolls, the bluebunch wheatgrass - big sage association on clay to sandy loam soils, and sand dropseed - red three-awn grassland on sandy terraces. The latter is one of the most restricted grassland types in British Columbia, now largely supplanted by agricultural land uses.

Wildflowers here include arrow-leaved balsam-root, mariposa lily, line-leaved fleabane, hairy golden-aster, white clematis, bitterroot, yellow bell, alumroot, brittle cactus, and dessert-parsley. Four rare plants noted in the reserve are Douglas' rabbitbrush (Chrysothamnus viscidiflorus), pale evening-primrose (Oenothera pallida), tufted phlox (Phlox caespitosa), and long-leaved phlox (Phlox longifolia).

Wildlife recorded on the reserve includes blue racer and bull snakes, coyotes, and a variety of birds. Birds noted to nest on the site are the California quail, western kingbird and rock wren; other typical species here are the western meadowlark, mourning dove, poor will, Lewis' woodpecker, magpie, northern oriole, house finch, and white-crowned sparrow.

OUTSTANDING FEATURES: A sample of the driest valley-bottom shrub-steppe and grassland communities in Canada.

OTHER INFORMATION: Order-in-Council no. 1003, 15 March 1972. Application no. 85. Map no. 82 E/4. Road access to northeast corner from Highway 97. The entire reserve is fenced, and past disruption has been minimal.


INSET
100
0
100m
L 790
PLAN 4230
E R/W
L 448
L 993
PLAN 22982
EX. PLAN E16335
PLAN CG 327 R/W
ECOLOGICAL RESERVE
PLAN 13248
L 791
PLAN 4230
119° 31'
49°04'
Tp 51
Tp 49
Osoyoos
Trailer Park
Campsite
Dump
Ecological Reserve 33
Lookout
RICHTER PASS
Swartz Creek
Spotted
Alkali
SCALE 1:50000
1
0
1
2
3
4 km

N.T.S.No. 82 E/4

ECOLOGICAL RESERVE No. 33
FIELD'S LEASE

BIG WHITE MOUNTAIN

E.R. #34

PURPOSE: To set aside ecosystems representative of the Engelmann spruce - Subalpine Fir and Alpine Tundra Zones in the southern interior.

LOCATION: 42 km ESE of Kelowna City Center

SIZE: 951 ha LAT: 49°45'N LONG: 118°55'W ELEVATION: 1890 - 2315 m

BIOGEOCLIMATIC ZONES: Engelmann Spruce - Subalpine Fir; Alpine Tundra

PHYSICAL FEATURES:

The reserve encompasses the northern flank of Big White Mountain in the Beaverdell Range. Except for ridges at its peak, the mountain has a rounded summit. The reserve rises gradually from the 1860 m contour which marks its west, north, and east boundary, to the mountain peak (2315 m) in its south-central area. Soils of various types occur, but are mostly thin and interrupted by frequent bedrock outcrops near the peak. Deep snow cover is present for much of the year.

BIOTIC FEATURES:

Typical stands of Engelmann spruce and subalpine fir occur in the lowest elevation northern parts of the reserve, and small areas of treeless alpine habitat surround the peak, however the bulk of its area supports an interesting transition between those types. With increasing elevation the spruce - fir stands become moderately open, then develop a parkland appearance in which islands of relatively tall trees are separated by meadows, and finally give way to scattered, stunted patches known as krummholz. Studies indicate that trees are gradually invading the alpine area.

Plant communities have only been described in a small part of the reserve above the 2164 m level, where 14 types were noted. These include krummholz communities dominated by either Engelmann spruce or subalpine fir, and tree islands in which these species reach tree stature and have an understory of grouseberry. Alpine communities dominated by common juniper, wooly pussytoes, sibbaldia, Parry's rush, pink mountain-heather or a combination of those plants occur on dry sites. Moist to wet areas support communities characterized by showy sedge, black alpine sedge, Sitka valerian, Indian paintbrush, or mosses.

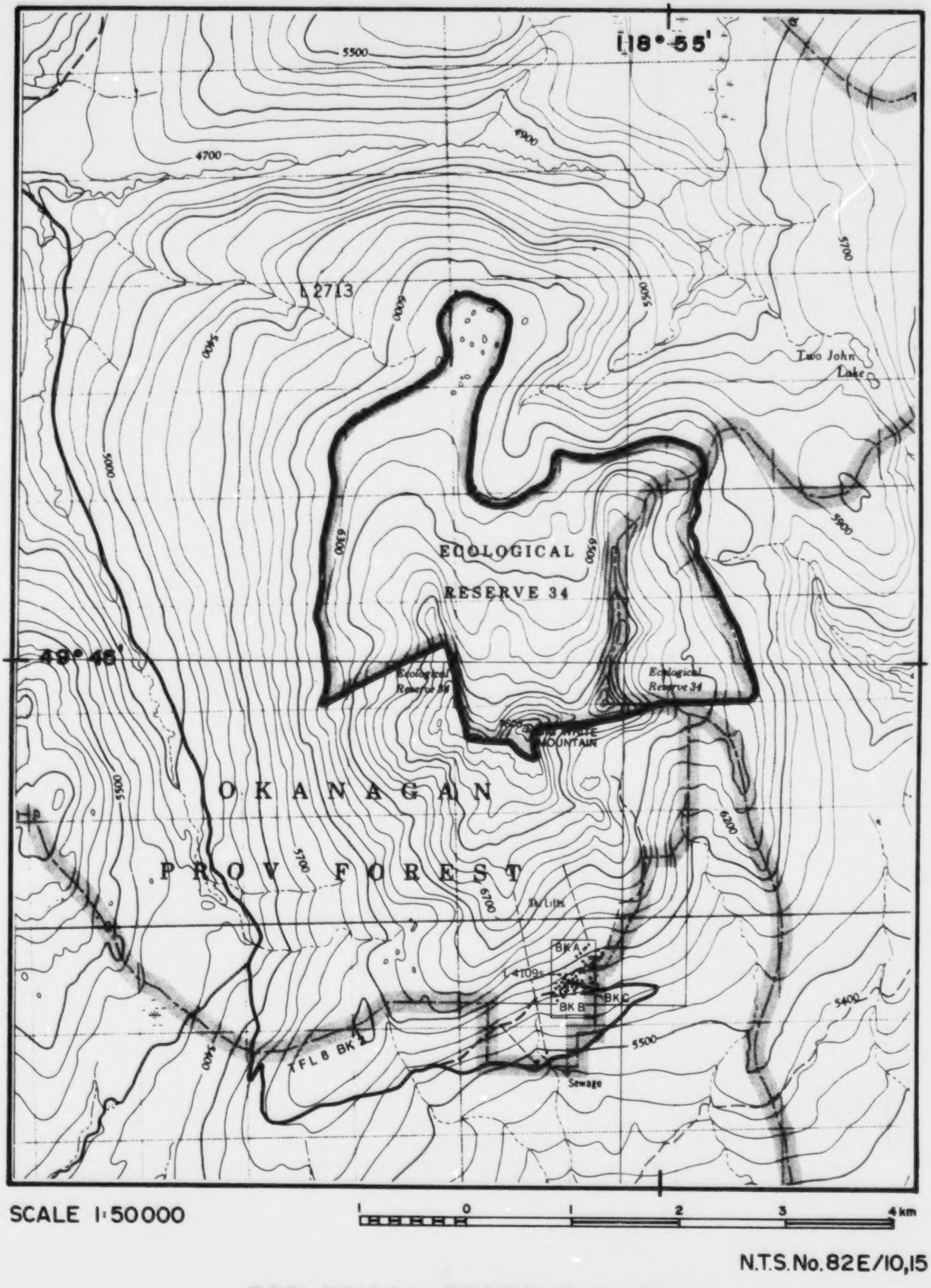
Seventy five species of seed plants have been recorded in the alpine part of the reserve, four of which are rare in the province. These are Engelmann's sedge (*Carex engelmannii*), Elmer's Indian paintbrush (*Castilleja elmeri*), alpine Indian paintbrush (*C. rhexifolia*), and alpine-wintergreen (*Gaultheria humifusa*).

Mammals recorded here include the wolverine, hoary marmot, marten, red squirrel, and snowshoe hare.

OTHER INFORMATION: Order-in-Council no. 1166, 24 March 1972 and no. 3949, 7 November 1972 (land deletion). Application no. 44. Map no. 82 E/10; E/15. Access by gravel road from Kelowna to Big White Ski Area, then 2 km walk.

One Ph.D. thesis on plant ecology is available.

2-34 B


118° 55'
49° 46'
5500
4700
4900
5700
5000
5400
6000
L 2713
5900
Two John Lake
ECOLOGICAL
RESERVE 34
Ecological Reserve 34
Ecological Reserve 34
6300
6500
BIG WHITE MOUNTAIN
OKANAGAN
PROV FOREST
6700
6200
Ski Lifts
BK A
BK B
BK C
L 4109s
TFL 8 BK 2
Sewage
5400
5500
SCALE 1:50000
1 0 1 2 3 4 km

N.T.S. No. 82E/10,15

ECOLOGICAL RESERVE No. 34
BIG WHITE MOUNTAIN

WESTWICK LAKE

E.R. #35

PURPOSE: To preserve a mosaic of aspen parkland vegetation types at the northern extremity of the Interior Douglas Fir Zone

LOCATION: 15 km S of Williams Lake

SIZE: 27 ha LAT: 51°59'N LONG: 122°10'W ELEVATION: 915 - 930 m

BIOGEOCLIMATIC ZONE: Interior Douglas Fir

PHYSICAL FEATURES:

The reserve comprises uplands on both sides of Westwick Lake, a shallow, slightly saline, elongate lake lying in a shallow northwest-southeast trending valley on the Fraser Plateau. Regional bedrock is predominantly lava, regional soils mostly Luvisols, although pockets of Chernozems occur. Lands in the reserve slope gently toward the lake, which has a boulder-strewn, muddy shoreline.

BIOTIC FEATURES:

The reserve is about one third grassland and two third forest. Continuous grassland tracts occur in the block north of the lake and in the southeast corner between the road and lake. Typical moderately grazed grasslands are dominated by needle-and-thread grass, bluebunch wheatgrass and northern bedstraw; heavily grazed sites by pussytoes and bluegrasses. Saline areas near the lake support an alkaligrass - foxtail barley association.

A Douglas fir - pinegrass - kinnikinnick association covers much of the upland, but smaller areas of aspen - lodgepole pine and white spruce forest are present. Pinegrass and kinnikinnick also dominate the understory in the latter types. Common plants in grassy forest openings include sticky geranium, death-camas, field chickweed, small-flowered penstemon, and lemonweed.

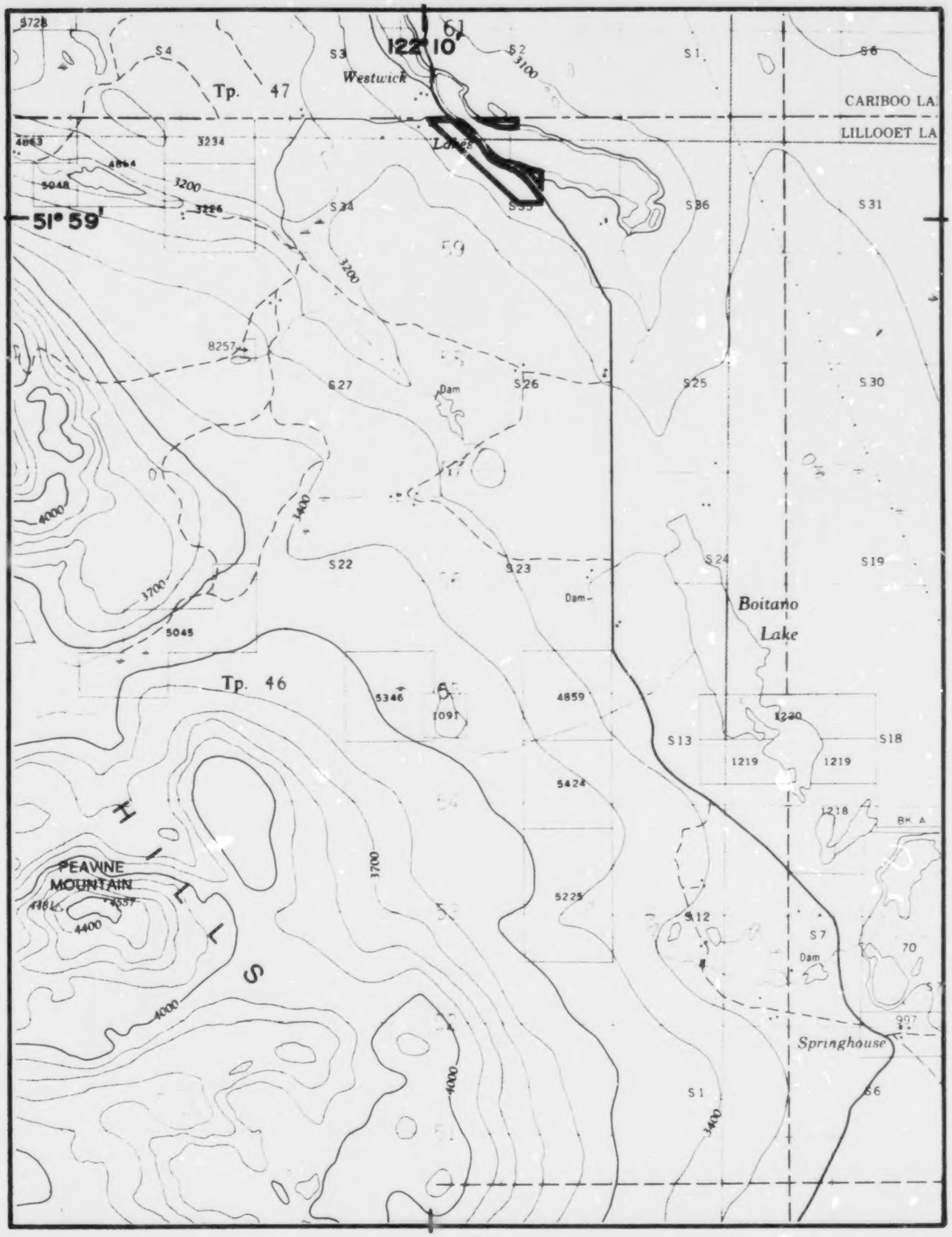
A wide variety of waterfowl utilize Westwick Lake, some of which undoubtedly depend upon upland sites in the reserve for nesting, either dense shrub-herb cover (dabbling ducks) or holes in trees (bufflehead; goldeneye). Several species of shorebirds are present seasonally. A diversity of terrestrial birds has been noted, including hole-nesting species lake swallows, woodpeckers, kestrels, nuthatches, and chickadees.

OTHER INFORMATION: Order-in-Council no. 1282, 6 April 1972, and 2146, 19 December 1984 (deletion of road allowance). Application no. 73. Map no. 92 O/16. Access by road.

Grasslands have been moderately to heavily grazed in the past. The two major grassland tracts are now individually fenced.

The reserve borders only a portion of Westwick Lake, and none of the lake bottom or waters are included. The lake has been the site of much entomological and limnological research by University of B.C. staff and graduate students, and is the type locality for several insect taxa.

2-35B


122°10'
51°59'
Westwick
Lake
Tp. 47
Tp. 46
CARIBOO LA
LILLOOET LA
Boitano
Lake
Springhouse
Dam
HILLS
PEAVINE
MOUNTAIN
3200
3400
3700
4000
4400

SCALE 1:50 000

1 0 1 2 3 4 km

N.T.S. No. 92 O/16

ECOLOGICAL RESERVE No. 35
WESTWICK LAKE

MACKINNON ESKER E.R. #36

PURPOSE: Protection of a segment of the longest known esker in British Columbia and vegetation types characteristic of eskers

LOCATION: 38 km SW of the community of McLeod Lake

SIZE: 583 ha LAT: 54°50'N LONG: 123°35'W ELEVATION: 945 - 1080 m

BIOGEOCLIMATIC ZONE: Sub-boreal Spruce

PHYSICAL FEATURES:

The central feature of this reserve is a superb segment of the Mackinnon compound esker, a sinuous ridge reported to be over 50 km long, the longest such landform in the province. The esker was formed during the waning stages of glaciation on the Nechako Plateau, a time when meltwater streams flowed through crevasses or tunnels in the stagnant ice, depositing their load of sand and gravel in the process. Within the reserve the main body of this esker is about 150 m wide and very prominent on air photos. Though termed a compound esker, its associated arms or branches are much less distinctive than its central trunk. Other glacial features in this area of undulating to flat plateau surface are drumlins sculpted by moving ice, and meltwater channels and kettle holes formed as the ice melted.

Two lakes are present, Turner (about 15 ha) and Carr (about 7 ha).

Upland soils are primarily sandy Podzols developed on glacial drift.

BIOTIC FEATURES:

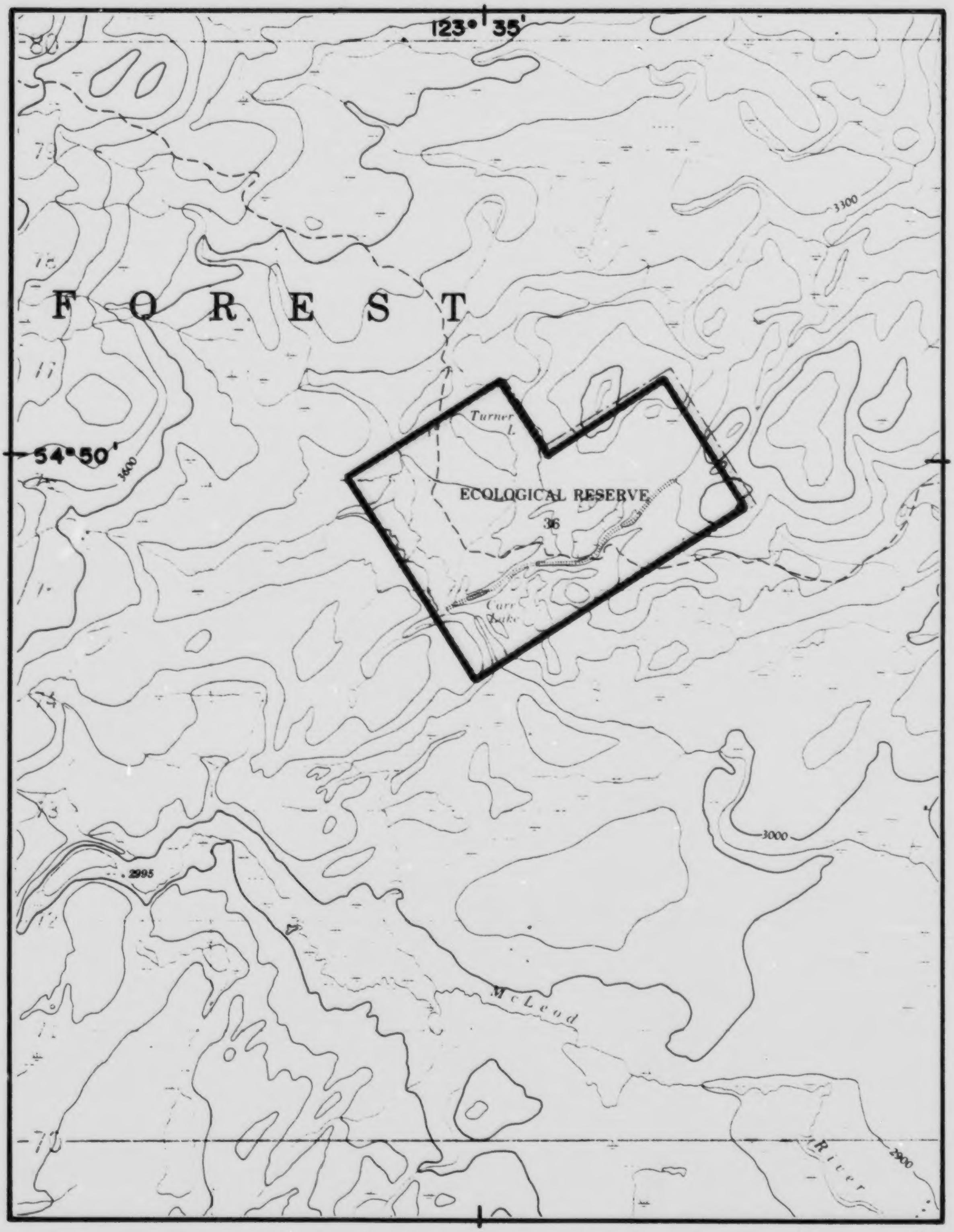
Vegetation on the gravelly, well-drained esker is rather uniform lichen-woodland dominated by few species. Lodgepole pine is almost the only tree and the open understory is characterized by the low shrub velvet-leaved blueberry, some kinnikinnick, and fruticose lichens. Herbaceous plants are poorly represented. A similar kind of lodgepole pine woodland in the reserve has dwarf blueberry rather than velvet-leaved blueberry in the understory. White spruce stands are common in the vicinity, including spruce - black huckleberry - moss, and spruce - subalpine fir - devil's club - oak fern associations. The latter type occurs on rich, moist sites. At higher elevations an Engelmann spruce - subalpine fir - white rhododendron community, transitional to the Engelmann Spruce - Subalpine Fir Biogeoclimatic Zone, is present.

The fauna has not been surveyed but moose are common around wetlands, and porcupines, chipmunks and mice have been observed. Birds seen here include evening and pine grosbeaks, golden eagles, and greater yellowlegs.

OUSTANDING FEATURES: A well-developed esker and associated vegetation.

OTHER INFORMATION: Order-in-Council no. 2096, 2 June 1972. Application no. 77. Map no. 93 J/13. Access by gravel road west from McLeod Lake or east from the Omineca Road. The access road cuts across the esker.

2-36B



123° 35'
54°50'
FOREST
Turner L.
ECOLOGICAL RESERVE
36
Carr Lake
McLeod
River
3300
3600
3000
2995
2900
80
79
78
77
76
75
74
73
72
71
70

SCALE 1:50000

1
0
1
2
3
4 km

N.T.S. No. 93 J/13

ECOLOGICAL RESERVE No. 36
MACKINNON ESKER

MOUNT MAXWELL E.R. #37

PURPOSE: To protect outstanding Garry oak stands and associated vegetation

LOCATION: Facing Sansum Narrows, central west coast of Saltspring Island

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SIZE: 65 ha LAT: 48°49'N LONG: 123°32'W ELEVATION: 0 - 475 m

BIOGEOCLIMATIC ZONE: Coastal Douglas Fir

PHYSICAL FEATURES:

The reserve is on the strongly sloping southwest side of Baynes Peak. Surficial materials are colluvium and weathered bedrock derived from sandstone. Soils are thin, poorly developed, and subject to summer drought. Dominant soils are Brunisols, but small areas of Podzols occur. Streams and wetlands are absent, except for local seepage. The dry summer climate is accentuated by the reserve's southwestern exposure.

BIOTIC FEATURES:

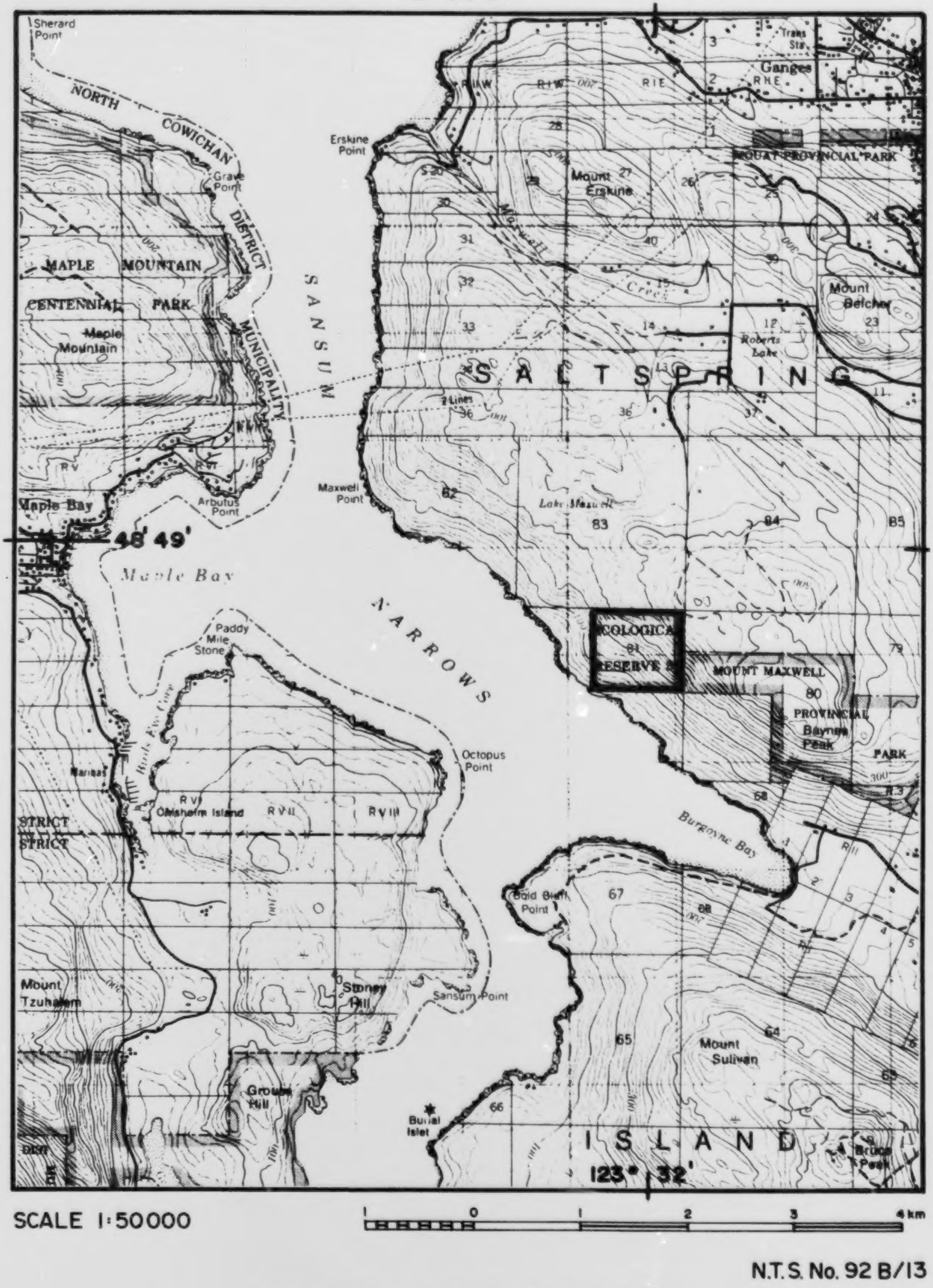
The reserve is largely forested, but due to its aridity and presence of rocky outcrops, the tree stands are fairly open, giving a parkland appearance. Three major habitat types are present, Garry oak stands, Douglas fir forest, and rocky outcrops. Transitional types occur between these, and a small logged area dominated by bracken fern and Scotch broom. Substrate variability results in frequent vegetation changes over short distances. Garry oak trees may occur in pure stands with a shrubless understory of grasses, forbs and mosses, or in stands mixed with Douglas fir and arbutus. Scrubby Douglas fir - arbutus forest with salal understory occurs on some dry sites, and Douglas fir - sword fern stands on the most moist areas with good soil development. Rock outcrops are dominated by moss and selaginella. Despite heavy grazing, many species of showy spring wildflowers occur on seasonally moist sites among the oak woods and rocky outcrops. About 140 species of vascular plants and 20 of mosses have been identified. Several plants that are rare in the province occur here. The reserve has a diverse insect fauna; preliminary surveys have identified 172 species representing 98 families. One species, the western oak looper, periodically defoliates oak and Douglas fir trees in the reserve.

The vertebrate fauna includes the Pacific tree frog, northern alligator lizard, northwestern garter snake, red-sided garter snake, Townsend vole, deer mouse, red squirrel, mink, raccoon, black-tailed deer and many birds.

OUTSTANDING FEATURES: Contains the largest protected stand of Garry oak in British Columbia.
Unusual plants include an unknown large species of desert-parsley (Lomatium) and prickly-pear cactus (Opuntia).

OTHER INFORMATION: Order-in-Council no. 2097, 2 June 1972. Application no. 89. Map no. 92 B/13.

Grazing by domestic sheep has greatly reduced understory vegetation in the oak woods, including most of the showy wildflowers. Eighteen hectares were fenced in 1984 to study vegetation responses to exclusion of sheep. Preliminary reports available on vegetation, insects, and vertebrates.


Sherard Point
NORTH COWICHAN DISTRICT MUNICIPALITY
Grave Point
MAPLE MOUNTAIN CENTENNIAL PARK
Maple Mountain
Arbutus Point
Maple Bay
48° 49'
Maple Bay
SANSUM NARROWS
Erskine Point
Mount Erskine
Maxwell Creek
Ganges
Trans Sta.
MOUAT PROVINCIAL PARK
Mount Belcher
Roberts Lake
SALTSPRING
Maxwell Point
Lake Maxwell
ECOLOGICAL RESERVE 37
MOUNT MAXWELL PROVINCIAL PARK
Baynes Peak
Paddy Mile Stone
Octopus Point
Chisholm Island
Burgoyne Bay
Bold Bluff Point
Stoney Hill
Sansum Point
Mount Tzuhalem
Grouse Hill
Burial Islet
Mount Sullivan
ISLAND
Bruce Peak
123° 32'

SCALE 1:50000

1 0 1 2 3 4 km

N.T.S. No. 92 B/13

ECOLOGICAL RESERVE No. 37
MOUNT MAXWELL

TAKLA LAKE

E.R. #38

PURPOSE: To reserve the most northerly known stand of Douglas fir as a genetic bank and for research purposes

LOCATION: W shore of Takla Lake, 120 km N of Burns Lake

SIZE: 263 ha LAT: 55°20'N LONG: 125°48'W ELEVATION: 685 - 1250 m

BIOGEOCLIMATIC ZONE: Sub-boreal Spruce

PHYSICAL FEATURES:

The reserve lies on hilly lower slopes of the Takla Range and includes about 2 km of Takla Lake shoreline. A large unnamed creek marks its south boundary; west and north boundaries largely follow heights of land. Slope exposure is predominantly to the east and northeast, with small areas of south-facing terrain in the creek valley along the south boundary. Average slope is about 25°. No lakes or wetlands are present.

BIOTIC FEATURES:

Of major importance here are stands of Douglas fir forest at the northern extremity of the species range in British Columbia. Despite the peripheral location, Douglas fir is the dominant tree on 60 ha of land, primarily within 150 m of the lakeshore. It also occurs as a minor species on another 40 ha, in association with trembling aspen, paper birch, white spruce, subalpine fir, and lodgepole pine. Most of the Douglas fir stands are young (90 - 100 years) and of medium growth quality, averaging 30 m in height. Some veteran firs, probably the progenitors of the younger stands, occur along the lakeshore.

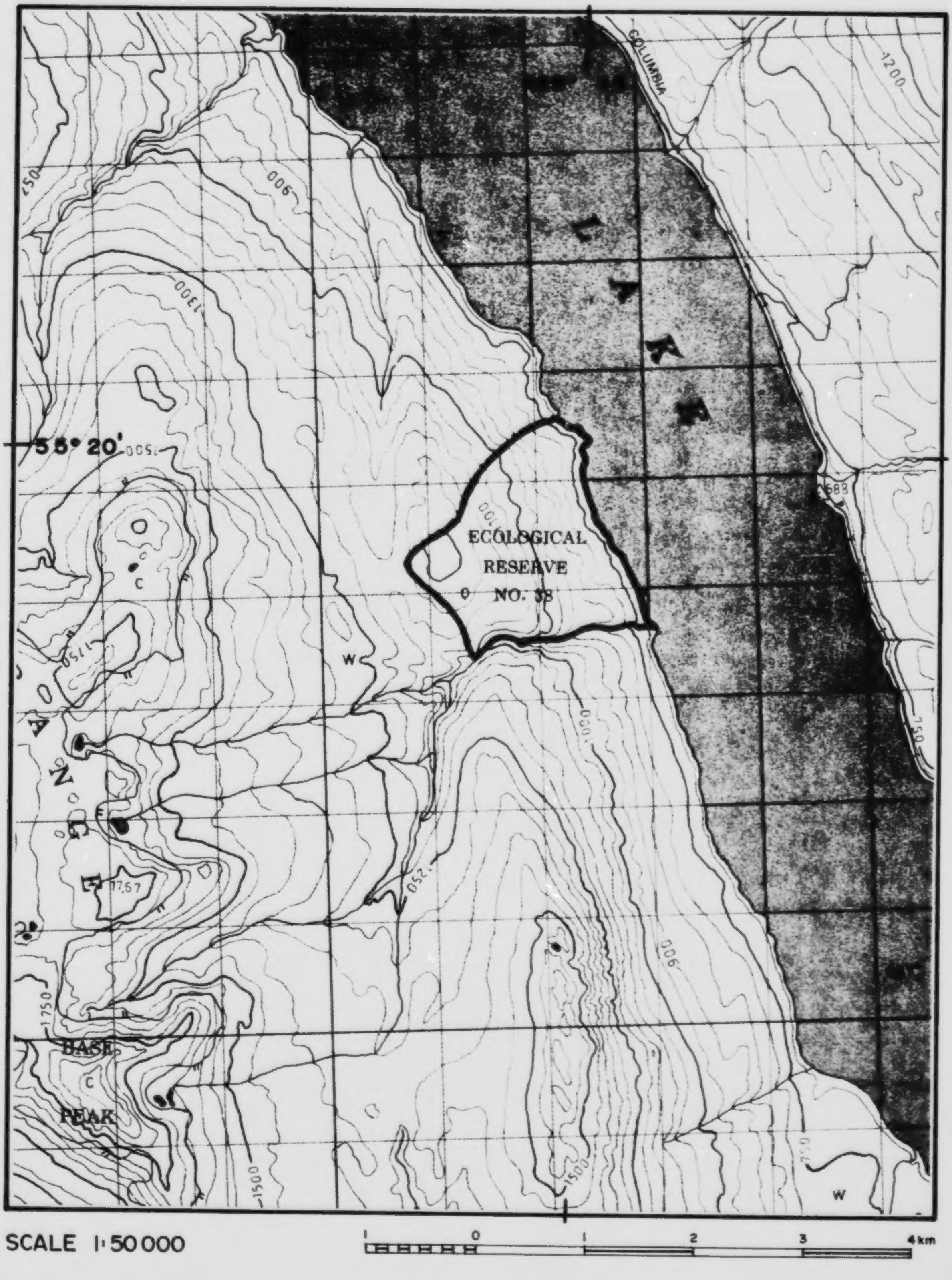
The Douglas fir stands, and some adjacent terrain where aspen and lodgepole pine are abundant, are within the Sub-boreal Spruce Zone. Above about the 1100 m level, forest stands are transitional to the Engelmann Spruce - Subalpine Fir Zone. Forest cover maps indicate that subalpine fir is dominant at higher elevations in the reserve, and that spruce and lodgepole pine are common associates. These stands vary from 80 to 200 years in age.

Neither understory vegetation nor fauna have been studied at this site.

OUTSTANDING FEATURES: This northern outpost of Douglas fir may provide genetic stock with features such as superior frost resistance and be of importance for reforestation of other lands. The reserve provides opportunities for research on competition between Douglas fir and other trees, and adaptation to a northern environment.

OTHER INFORMATION: Order-in-Council no. 2098, 2 June 1972. Application no. 90. Map no. 93 N/5. Access by boat on Takla Lake.

The reserve is in a natural state. A fairly heavy indicence of the fungus _Fomes pini_ has been noted on Douglas fir in the reserve.


55° 20'
ECOLOGICAL
RESERVE
NO. 38
LAKE
COLUMBIA
BASE
PEAK
1200
900
1300
1500
1750
1767
750
683
W
C
SCALE 1:50 000
1
0
1
2
3
4 km

N.T.S. No. 93 N/5

ECOLOGICAL RESERVE No. 38
TAKLA LAKE

SUNBEAM CREEK E.R. #39

PURPOSE: To protect a variety of alpine communities representative of the western edge of the Rocky Mountains

LOCATION: McBride Peak, 5.5 km NE of the town of McBride

SIZE: 511 ha LAT: 53°21'N LONG: 120°06'W ELEVATION: 1830 - 2270 m

BIOGEOCLIMATIC ZONE: Alpine Tundra

PHYSICAL FEATURES:

The reserve encompasses McBride Peak and adjacent summits to the northeast and northwest. These mountains form the western-most flank of the Park Range, immediately adjacent to the Rocky Mountain trench. Mountains in the reserve have generally rounded summits, having been overtopped by a dome of Pleistocene ice which reached the 2450 m elevation. They therefore lack the matterhorn-like peaks of higher mountains further east in the Park Ranges which protruded above the regional ice sheet, e.g. Mount Robson. Local alpine glaciers and stream erosion during the past 10,000 years have dissected the rounded summits to some extent, producing U-shaped valleys separated by relatively sharp crests. Surficial materials are largely morainal and colluvial. Freeze-thaw action has resulted in characteristic alpine features like solifluction lobes and frost-shattered rock. The climate is cold and windy. Glaciers do not presently exist, but snow patches are present on north-facing slopes for most of the summer. Drainage is via Sunbeam Creek and McKale River into the Fraser.

BIOTIC FEATURES

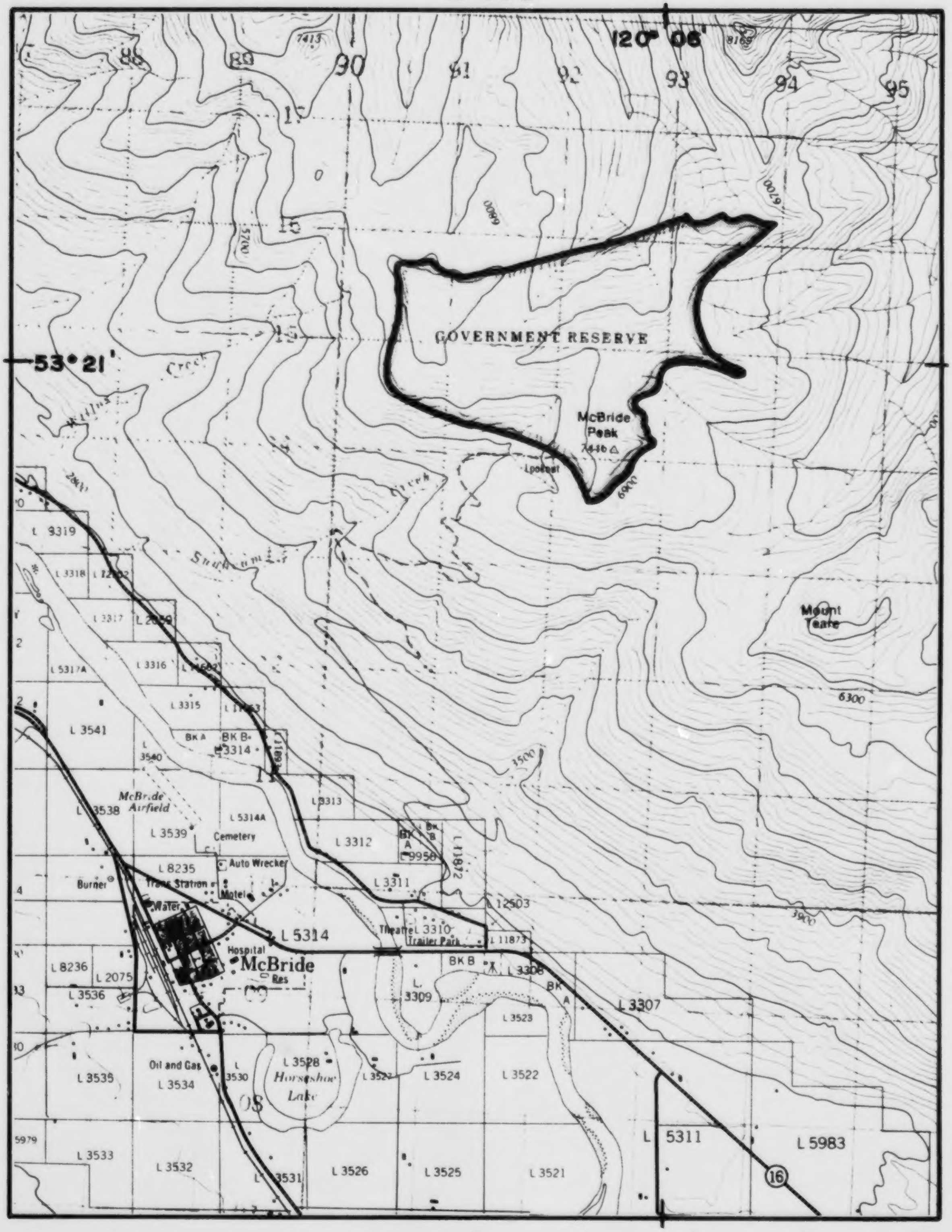
Slopes in the reserve face all directions of the compass and terrain varies from moist streambottoms to alpine crests, therefore a variety of alpine plant communities are present. To date however these have been only superficially described. A few scattered whitebark pine and subalpine fir trees, largely in a krummholz form, occur on slopes along stream valleys in the lowest parts of the reserve (1830 - 1950 m). These areas may have affinities with the Engelmann Spruce - Subalpine Fir Zone, but are extremely limited in extent. The bulk of the reserve is in the Alpine Tundra Zone.

Extensive well-drained slopes above treeline are dominated by pink, yellow, and white mountain-heather and white mountain-avens. White rhododendron, oval-leaved blueberry, Sitka valerian and Indian hellebore are common at lower elevations. Moss campion, glaucous gentian, and a variety of grasses, sedges, and lichens are present.

The fauna has not been surveyed but grizzly bears, mountain caribou, wolverine, hoary marmots, and ptarmigan are known to occur and a variety of other alpine species can be expected.

OTHER INFORMATION: Order-in-Council no. 2099, 2 June 1972. Application no. 71. Map no. 93 H/8. Access to vicinity of reserve is available by foot or four-wheel drive vehicle up fire lookout road, east of McBride.

2-39B


120° 06'
53° 21'
GOVERNMENT RESERVE
McBride Peak
Mount Teare
Sunbeam Creek
McBride
McBride Airfield
Cemetery
Auto Wrecker
Motel
Hospital
Theatre
Trailer Park
Horseshoe Lake
Oil and Gas
L 5314
L 3307
L 5311
L 5983
16

SCALE 1:50 000

1 0 1 2 3 4 km

N.T.S. No. 93 H/8

ECOLOGICAL RESERVE No. 39
SUNBEAM CREEK

KINGCOME/ATLATZI RIVERS E.R. #40

PURPOSE: To preserve unusual lodgepole pine, Sitka spruce, and alder swamps and associated open wetlands in a coastal alluvial landscape

LOCATION: Central mainland coast, 10 km N of the head of Kingcome Inlet

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SIZE: 414 ha LAT: 51°02' - 51°05'N LONG: 126°07' - 126°10'W
ELEVATION: 20 - 400 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

The reserve consists of two units, 2 km apart, on the floor of the Kingcome River valley. Mountains adjacent to the reserve rise to 1700 m, but those at the headwaters of the Kingcome River are among the highest in the province. Proximity to the center of origin of the most ponderous glaciers in British Columbia resulted in pronounced glacial scouring, isostatic depression, and marine flooding, and in probable persistence of glacial environments until a relatively late date. The relatively broad, low-gradient valley of the lower Kingcome River and its peculiar and wetlands are unusual in the Coast Mountains and undoubtedly reflect local glacial history.

BIOTIC FEATURES:

Fairly extensive stands of lodgepole pine in a fen-swamp environment are what first focussed attention on this area. The northern unit shows zonation from a wet central fen-marsh through extensive hardhack swamps and boggy pine forest to better drained sites supporting Sitka spruce, western hemlock, and western redcedar. The southern unit has less open fen but equally large hardhack swamps, surrounded by lodgepole pine bog forest which gives way to mixed woods containing cottonwood, red alder, Sitka spruce, and hemlock.

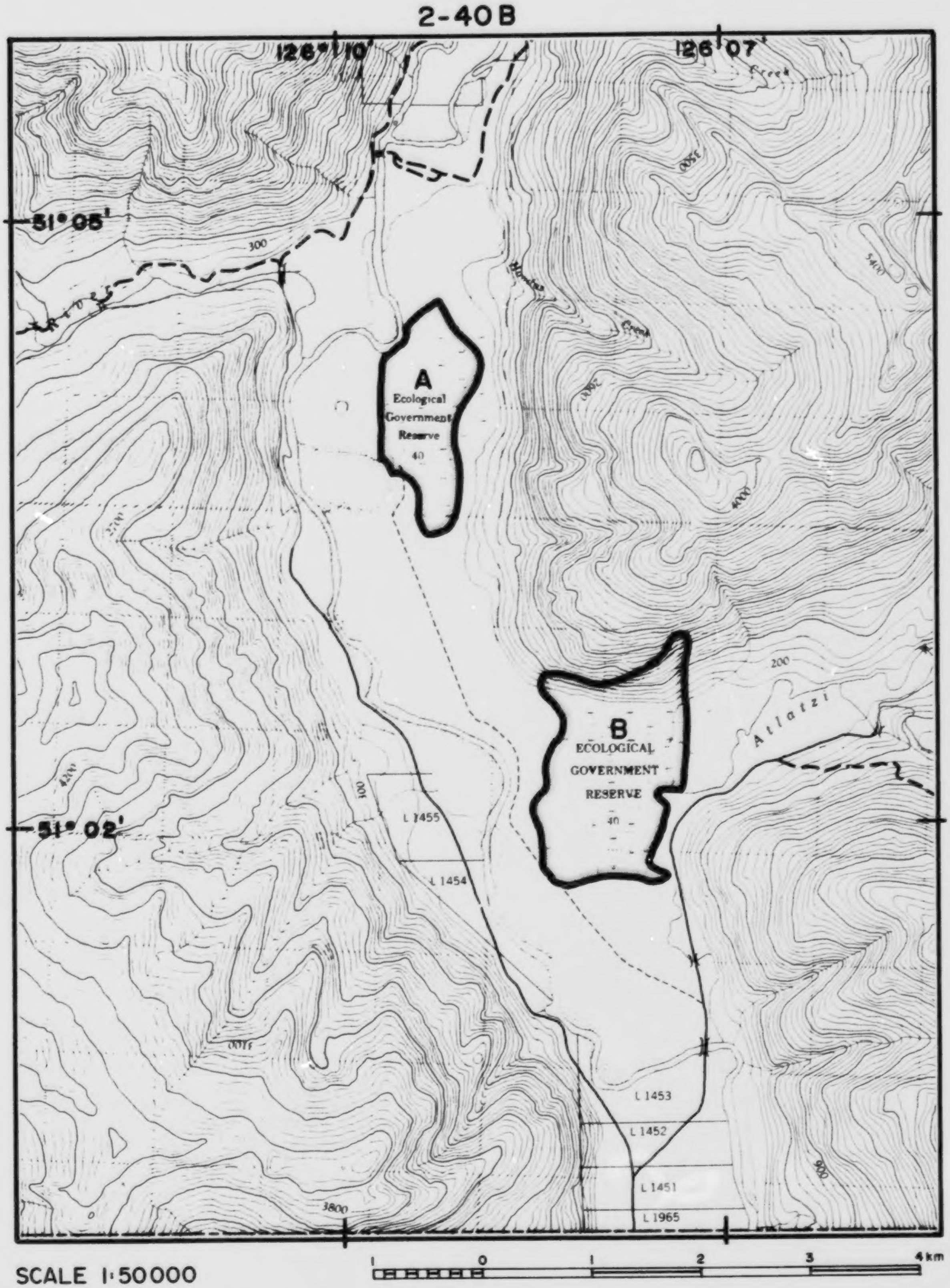
A great variety of wetland communities are present. Open wetlands may be dominated by sedges, cotton-grass, marsh cinquefoil, swamp horsetail, or buckbean. Hardhack and Sitka sedge cover large treeless swamps. Treed swamp communities contain all or some of lodgepole pine, red alder, western redcedar, Sitka spruce, hardhack, huckleberries, blueberries, crab apple, black twinberry, and salmonberry, and are always characterized by skunk cabbage and sometimes slough sedge and water-parsley.

The presence of both black and grizzly bears has been confirmed, but neither the vertebrate nor invertebrate fauna have been surveyed.

OUTSTANDING FEATURES: An unusual diversity of swamps, associated fens, and pine bogland in a coastal valley bottom.

OTHER INFORMATION: Order-in-Council no. 2866, 27 July 1972. Application no. 91. Map no. 92 M/1. Access by foot from nearby logging roads. The floodplain, including fringes of the reserve, was logged in the 1920's.

2-40B



126°10'
126°07'
51°05'
51°02'
Creek
300
3500
5400
Creek
A
Ecological
Government
Reserve
40
4000
200
Atlatzi
B
ECOLOGICAL
GOVERNMENT
RESERVE
40
100
L 1455
L 1454
L 1453
L 1452
L 1451
L 1965
900
3800
1
0
1
2
3
4 km

SCALE 1:50000

N.T.S. No. 92M/1

ECOLOGICAL RESERVE No. 40
(A) KINGCOME RIVER (B) ATLATZI RIVER

TACHEEDA LAKES

E.R. #41

PURPOSE: To retain mature forest ecosystems representative of the wet cool Sub-boreal Spruce subzone and its transition with the Engelmann Spruce - Subalpine Fir Zone

LOCATION: 80 km N of Prince George; 2.5 km SE of Tacheeda Lakes

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SIZE: 526 ha   LAT: 54°41'N   LONG: 122°30'W   ELEVATION: 870 - 1295 m

BIOGEOCLIMATIC ZONES: Sub-boreal Spruce; Engelmann Spruce - Subalpine Fir

PHYSICAL FEATURES:

The reserve lies in an area of rolling wooded hills between the Parsnip and Crooked Rivers. Its northeastern extremity encompasses the southwestern slopes of Tacheeda Mountain, almost to its rounded summit at the 1295 m level. Small streams in shallow valleys flow south-westward from Tacheeda Mountain, eventually finding their way into Tacheeda Lakes (outside the reserve) and the Parsnip River. One lake in the reserve, near the south edge, is about 10 ha in size. Soils are primarily Podzols and Luvisols.

BIOTIC FEATURES:

Except for the lake, one wetland of about 10 ha, and a few small scattered bogs, the reserve is entirely forested. Most of it is in the Sub-boreal Spruce Zone, with forest stands dominated by white spruce. Small areas at higher elevations support subalpine forest vegetation.

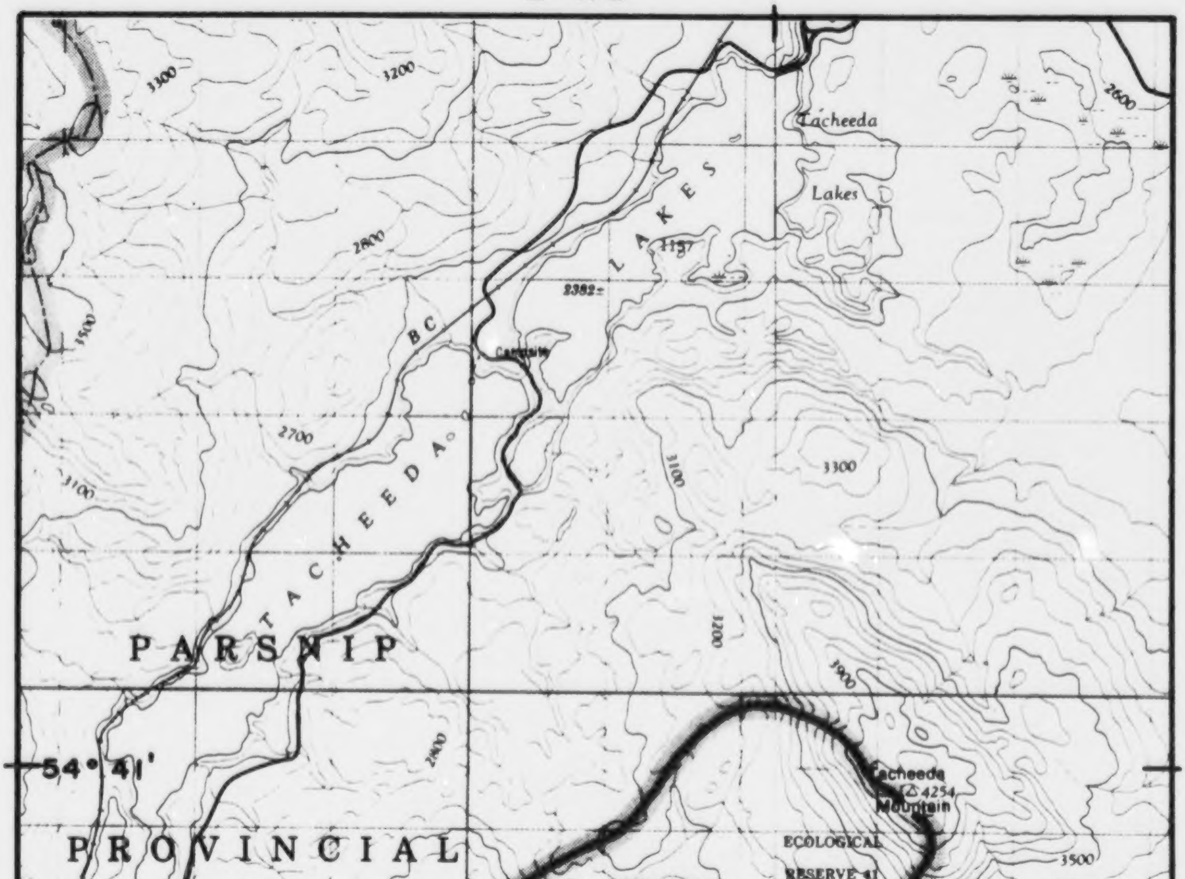
Three white spruce communities have been described. On the richest sites subalpine fir is subdominant and devil's club (up to 3 m tall) and oak fern characterize the understory. Other white spruce - subalpine fir stands lack devil's club but contain oak fern and much knight's plume moss. More or less pure stands of white spruce having shrub cover dominated by black huckleberry, and ground cover of mosses, are also present. On drier sites and old burns the spruce forest contains some trembling aspen and Douglas fir. Douglas fir attains good growth here despite being within a few kilometers of its northern limit of range.

Wetlands, many resulting from activity of beavers, are typically dominated by water sedge and beaked sedge and may be rimmed by stands of scrub birch, willows, and black spruce. Buckbean is common in shallow ponded areas. Bogs characterized by sphagnum mosses or by long-leaved sundew and sickle moss also occur.

Typical subalpine woods are of the Engelmann spruce - subalpine fir - white rhododendron type.

OTHER INFORMATION: Order-in-Council no. 3276, 1 September 1972. Application no. 75. Map no. 93 J/9; J/10. Access is by trail from Tacheeda Lakes. Logging is occurring in the vicinity.

2-41B


Tacheeda
Lakes
TACHEEDA LAKES
BC
Campsite
PARSNIP
PROVINCIAL
FOREST
McGREGOR
54° 41'
122° 30'
ECOLOGICAL RESERVE 41
ECOLOGICAL RESERVE 41
Tacheeda Mountain
4254
3300
3200
2800
2700
3100
1100
1200
3900
3500
3000
2800
3000
2707±
3000
3200
2600
2382±
3137
1000

SCALE 1:50000

0
1
2
3
4 km

N.T.S. No. 93 J/9,10

ECOLOGICAL RESERVE No. 41
TACHEEDA LAKES

MARA MEADOWS E.R. #42

PURPOSE: Protection of a unique calcareous fen and its diverse flora, including several rare orchids

LOCATION: In the Larch Hills, 17 km N of Enderby

SIZE: 189 ha LAT: 50°41'N LONG: 119°07'W ELEVATION: 670 - 730 m

BIOGEOCLIMATIC ZONE: Interior Cedar-Hemlock

PHYSICAL FEATURES:

The reserve lies in a shallow north - south oriented valley near the southeastern edge of the Larch Hills. Hills rise to about 1000 m on both sides of the reserve. Topography within the reserve is quite flat except for two low, oval, drumlin-like hills in its north - central area. The reserve encloses an area of impeded drainage at the headwaters of two streams.

Much of the uniqueness of this area is attributed to carbonate-rich springs emanating from limestone bedrock or surficial materials derived from the Sicamous Formation. Evidence for this includes the presence of marl pools and the formation of calcareous deposits on some aquatic plants. Soils in the wetlands and meadows are organic in origin, evidently underlain by a layer of marl.

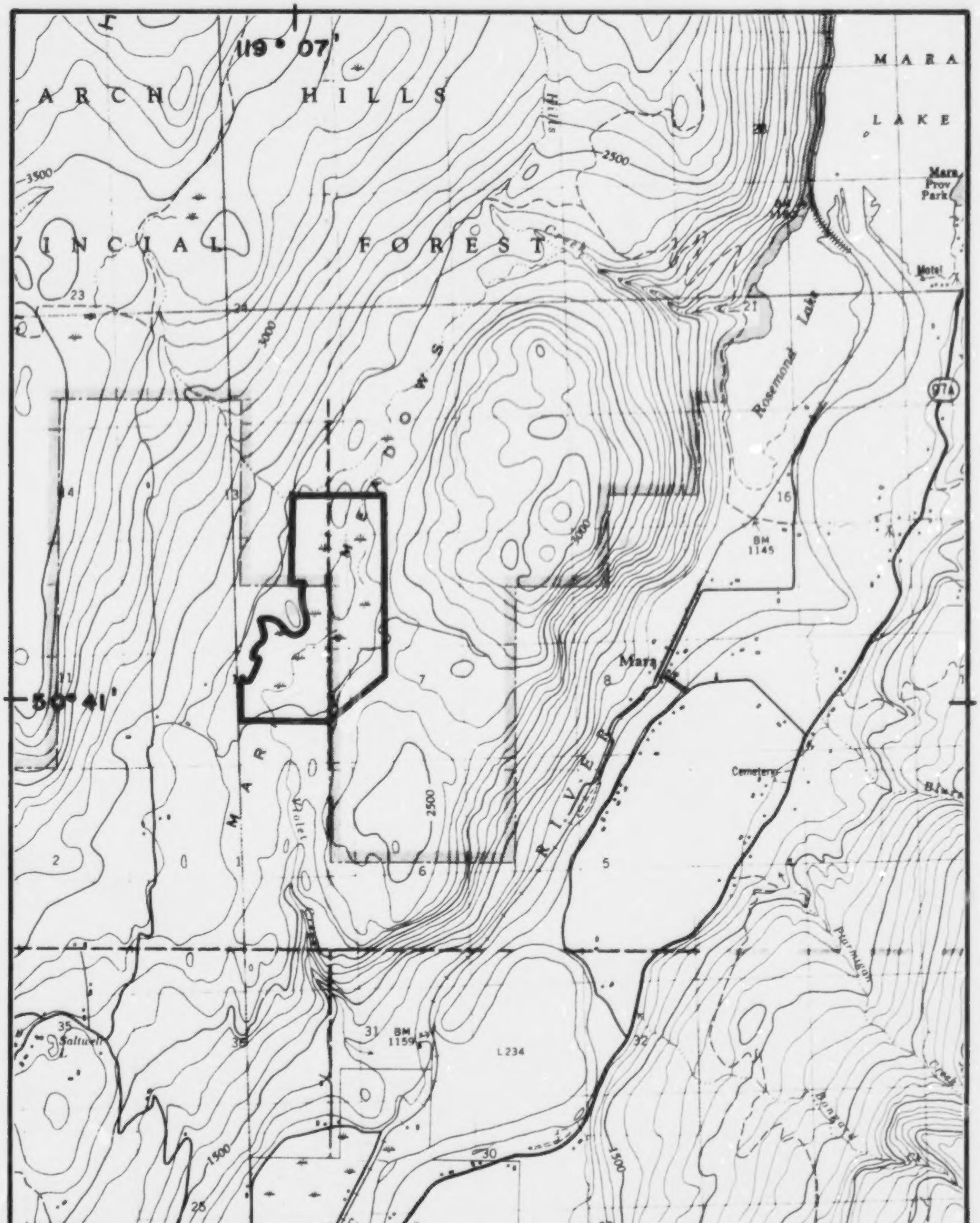
BIOTIC FEATURES:

The major feature of the reserve is a large treeless wetland centrally located in the southern half of the reserve. This is bordered by upland forest around its eastern and northern edges, and be predominantly boggy forest along its western side. Plant communities in the large wetland vary with the moisture regime. The lowest-lying central areas of the wetland have many pools of standing water. These are surrounded by expanses of fen and wet meadow which get drier toward the forest margin. Herbaceous plants dominate the open wetlands which are enriched by seepage of external water into and through them and therefore best classified as fens.

A small pond and the central drainage ditch support submerged communities dominated by greater bladderwort, water-milfoil and muskgrass. The marl ponds have a margin of great bulrush, spikerush, and aquatic mosses, but little else. The relatively extensive fen-meadow communities, of major interest here, tend to be dominated by bulrush, spike-rush, and sedges. Considerable moss is present in the wettest fens while less saturated meadows contain a variety of wildflowers like Kalm's lobelia, mountain death-camas, fringed grass-of-Parnassus, giant helleborine, Canadian butterweed, boreal aster, Canada goldenrod, and northern bog violet.

Various kinds of treed wetland contribute to habitat diversity. These vary from typical wet meadows containing scattered spruce trees and willows to dense lodgepole pine stands with an understory of Labrador tea, bog cranberry, buckbean, and sphagnum moss. Also present are hummocky bog forests with ponds of water, dominated by Engelmann spruce, western

2-42B


119° 07'
ARCH HILLS
INCIAL FOREST
MARA LAKE
Mara Prov Park
Motel
Hills
Creek
3500
3000
2500
1500
Rosemond Lake
97A
MEADOWS
BM 1145
BM 1159
Mara
50° 41'
RIVER
Cemetery
MAR
Violet
Saltwell L.
L234
Ptarmigan
Bongard Cr.
Creek
23
24
21
14
13
16
11
7
8
2
1
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6
35
36
31
32
30
28
26
29
SCALE 1:50000
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1
2
3
4 km

N.T.S. No. 82L/11

ECOLOGICAL RESERVE No. 42
MARA MEADOWS

redcedar, and mountain alder with an understory of black twinberry, cattail, skunk cabbage and fowl mannagrass. Standing dead trees occur in the latter type. Boggy islands within the wetlands support stunted conifer stands, some dominated by lodgepole pine, others by white spruce and redcedar.

Upland forests tend to be dominated by Douglas fir or western hemlock with falsebox and mosses characterizing the understory.

Variations in moisture, nutrient availability, and soil and water chemistry have resulted in a great diversity of habitats and plant species in this relatively small reserve. A preliminary inventory lists over 220 species of higher plants, 56 mosses and 43 lichens. The complement of trees is impressive.

The reserve and its delicate wetlands and meadows are of particular importance for orchids. Fourteen of 32 species recorded in British Columbia occur here, a diversity unmatched anywhere else in the province. Species rare in British Columbia include the yellow lady's-slipper (*Cypripedium calceolus*), sparrow's egg lady's-slipper (*C. passerinum*), Loesel's liparis or fen orchid (*Liparis loeselii*), and giant helleborine (*Epipactis gigantea*). Mara Meadows is the only known fen orchid site west of Manitoba. The giant helleborine is a threatened species in Canada. Other rare plants in the reserve are mallow ninebark (*Physocarpus malvaceus*), slimstem small reed grass (*Calamagrostis stricta*) and common reed (*Phragmites australis*).

About 50 species of birds have been seen in the reserve, mostly during migration periods. Species nesting in the wetlands include mallards, snipe, and probably one pair of greater sandhill cranes. The sandhill crane is a rare nesting bird in British Columbia. Mammals include mule deer, black bear, coyote, snowshoe hare, and red squirrel. Garter snakes, Pacific treefrogs, spotted frogs and wood frogs occur. Forty six species of spiders have been collected of which six are new to British Columbia.

OUTSTANDING FEATURES: A variety of wetland habitat types including unique calcareous fens; high species diversity among vascular plants, including 14 species of orchids of which four are rare; nesting by greater sandhill cranes; site of collection of six species of spiders new to the province.

OTHER INFORMATION: Order-in-Council no. 3277, 1 September 1972, and 1063, 28 March 1974 (land addition). Application no. 83. Map no. 82 L/11. Accessible from Highway 97A by Grandview Flats and Edgar Roads but closed to the public by Order-in-Council (no. 1920, 16 June 1977) to protect fragile vegetation. A permit is required to enter the reserve.

Despite early attempts to drain the wetlands they are largely intact. A dam has been installed in the former drainage ditch to prevent excessive drainage.

A comprehensive natural history account is available.

Members of the North Okanagan Naturalists Club have been instrumental in proposing, describing and protecting this reserve.

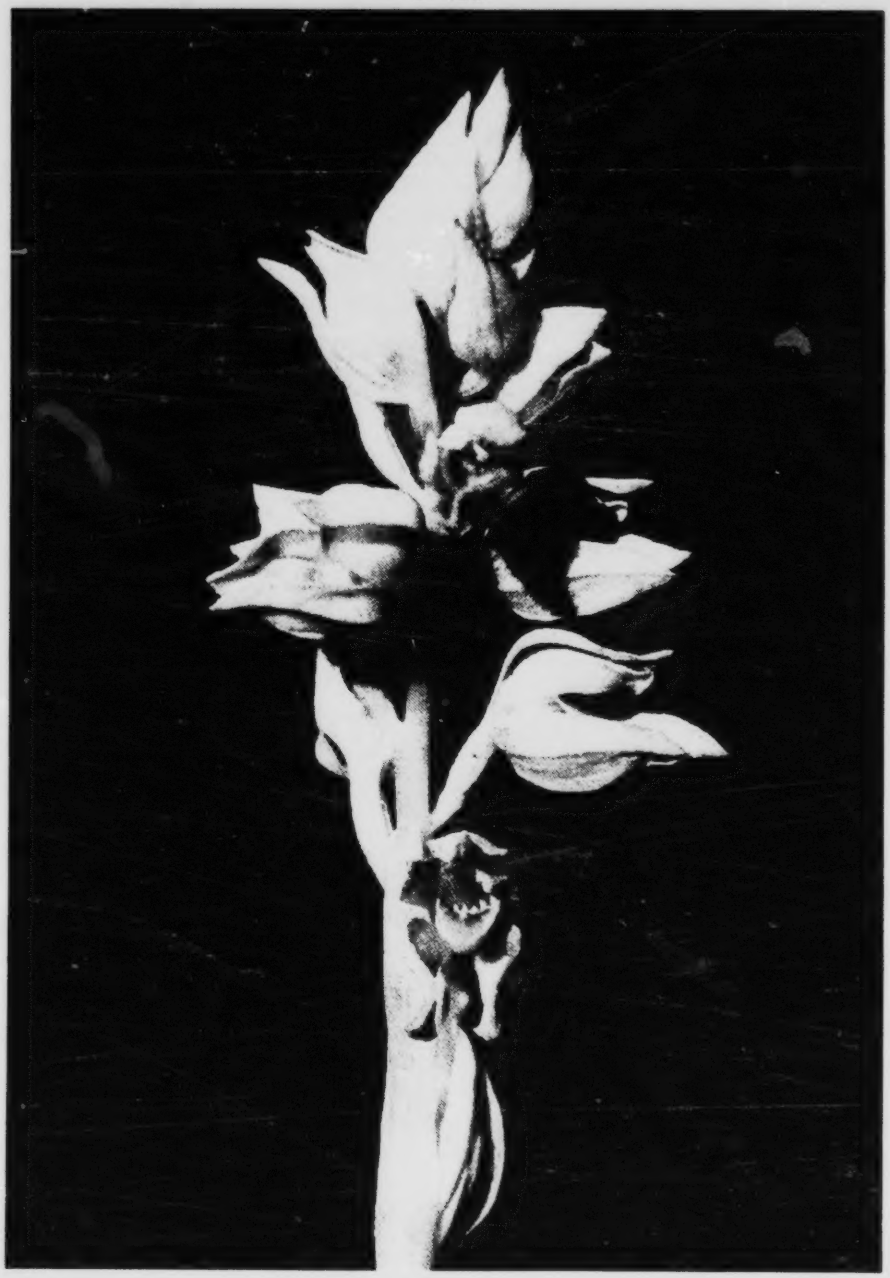


Figure 5. Protection of Rare and Endangered Plant Species in the Katherine Tye Ecological Reserve (#116)

The protection of rare and endangered animal and plant species is one of the objectives of the Ecological Reserves Act. A small population of the phantom orchid (*Cephalanthera austinae*), one of the rarest plants in the province, is protected in this ecological reserve near Sardis, B.C. The reserve is named in memory of the late Mrs. Katherine Tye who has observed these intriguing plants for 20 years and donated land toward the establishment of the reserve. (Photo R. Long)

MOUNT GRIFFIN

E.R. #43

PURPOSE: Reservation of an elevational sequence of habitats from valley bottom wetlands to alpine in an area of wet interior climate

LOCATION: 26 km SW of Revelstoke

SIZE: 1,376 ha LAT: 50°53'N LONG: 118°33'W ELEVATION: 535 - 2160 m

BIOGEOCLIMATIC ZONES: Interior Cedar - Hemlock; Engelmann Spruce - Subalpine Fir

PHYSICAL FEATURES:

Mount Griffin is situated at the northeastern end of the Hunters Range within the Shuswap Highland. The reserve, with its base on the southeast side of Wap Creek valley and its apex at the peak of Mount Griffin, has an irregular hour-glass shape and encompasses 1625 m of elevational range. Wap Creek valley, flat and about 300 m wide, contains two small lakes, wetlands, and a meandering stream which flows south through Wap Lake (outside the reserve) to Mabel Lake. The reserve has steep lower mountain slopes (about 35°), a plateau-like middle section, and slopes averaging about 10° from the plateau to the peak.

BIOTIC FEATURES:

Major vegetation types on the Wap Creek floodplain are willow - alder riparian shrublands; sedge meadows containing at least 12 species of sedges, sphagnum moss, scattered alder and willow; and ponded environments dominated by waterlily, water sedge, and swamp horsetail.

Forested slopes to about the 1425 m level are within the Interior Cedar - Hemlock Zone, although Douglas fir is well represented due to the steep, southerly aspect. Stands of mixed Douglas fir and western hemlock predominate, but some lodgepole pine, western redcedar, and paper birch are present. Above this, in the Engelmann Spruce - Subalpine Fir Zone, subalpine fir is the dominant tree, some spruce is present, and black huckleberry and white rhododendron characterize the understory. Small bogs occur in flat subalpine terrain. Above about the 1800 m level the forest assumes a parkland to krummholz appearance, with intervening meadows in which black alpine sedge, mountain hair-grass, pussy toes, and alpine club-moss are common.

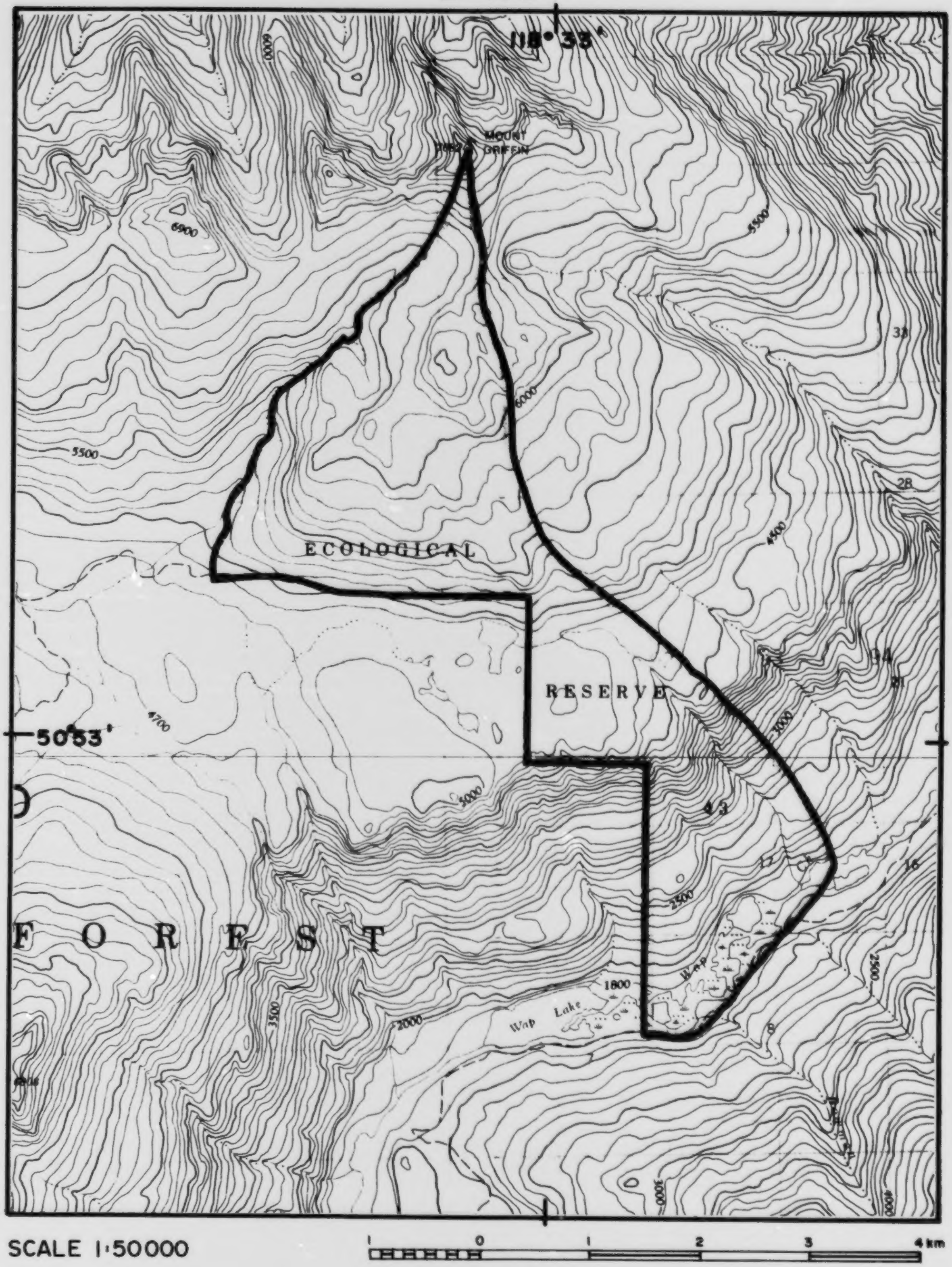
Rare plants include crested shield fern (Dryopteris cristata) and grooved agrimony (Agrimonia striata).

The wetlands have a low capability for waterfowl use because spring flooding coincides with the nesting season. Lower slopes and wetlands are important winter range for moose.

OTHER INFORMATION: Order-in-Council no. 3278, 1 September 1972. Application no. 67. Map no. 82 L/15. The wetlands are accessible via logging road between Three-Valley Gap and Mabel Lake; upper levels via Yard Creek Valley logging roads. Logging is approaching the reserve boundaries.

A preliminary natural history report has been prepared.

2-43B


118°33'
MOUNT GRIFFIN
6900
6000
5500
ECOLOGICAL
RESERVE
FOREST
50°53'
4700
5000
4500
3000
2500
3500
2000
1800
Wap Lake
Wap
33
28
34
21
43
17
16
8
4000
1
0
1
2
3
4 km

SCALE 1:50000

N.T.S. No. 82L/15

ECOLOGICAL RESERVE No. 43
MOUNT GRIFFIN

EAST COPPER/JEFFREY/RANKINE ISLANDS E.R. #44

PURPOSE: To protect colonies of nesting seabirds and their habitat

LOCATION: E coast of Moresby Island, Queen Charlotte Islands. Jeffrey and East Copper are at the entrance to Skincuttle Inlet, 47 km N of Cape St. James; Rankine Islands are at the entrance to Carpenter Bay, 34 km N of Cape St. James

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SIZE:	LAT:	LONG:	
121 ha	52°21'N	131°11'W	(Jeffrey/East Copper)
	52°15'N	131°03'W	(Rankine)

ELEVATION: 0 - 35 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

These are low, almost level islands with moderately indented, rocky shorelines. A few very small pocket beaches occur on the three largest islands. Shorelines are mostly sloping rock with a few small cliffs. A thin mantle of forest soil covers most land above high tide level.

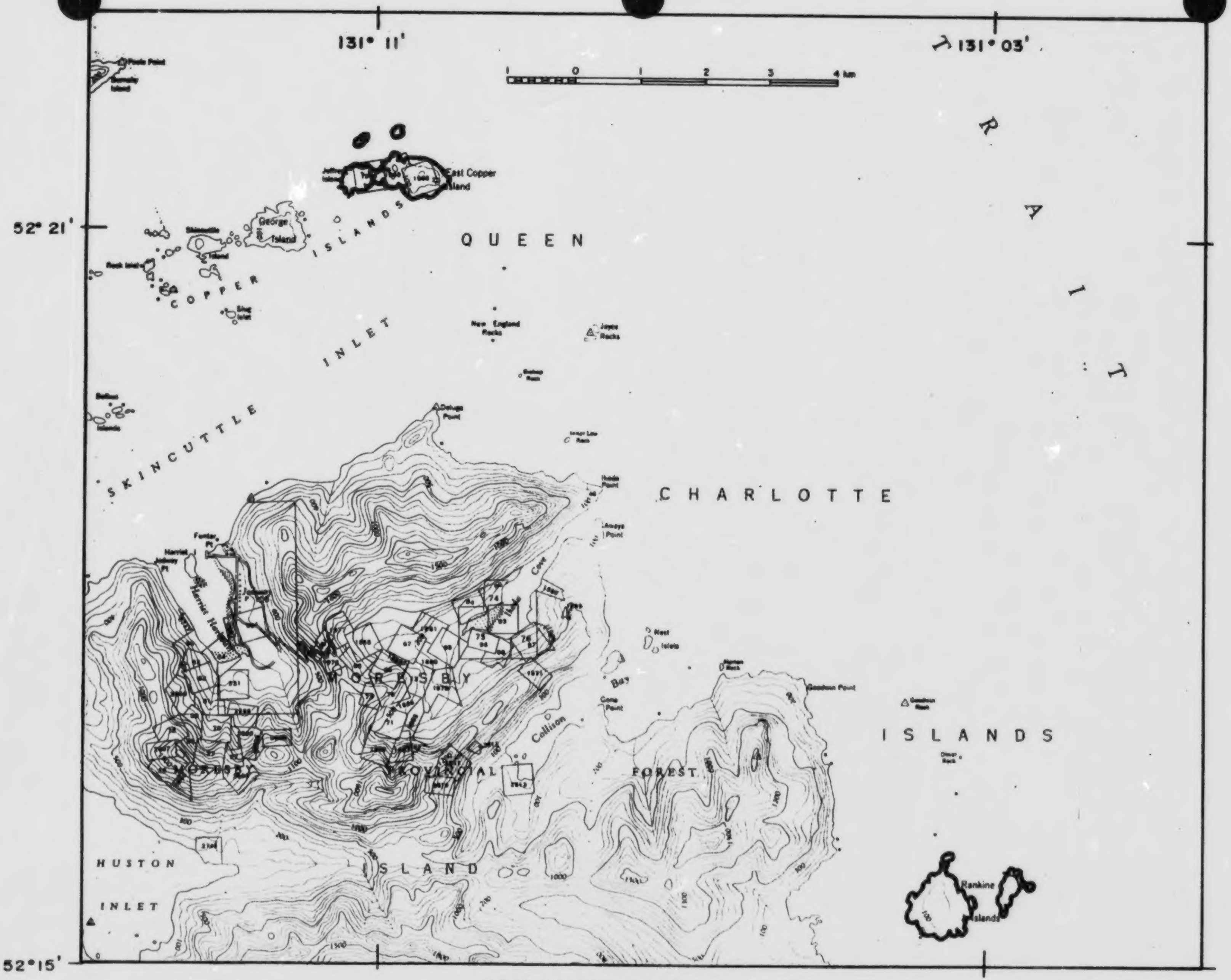
BIOTIC FEATURES:

Jeffrey, East Copper and Rankine Islands are forested over most of their area; East Rankine, the smallest in the reserve, has a central shrubby core with a few, scattered, windswept spruces. The forest on Jeffrey is almost entirely of Sitka spruce, that on East Copper is dominated by spruce and western hemlock, while Rankine has hemlock-spruce forest with the occasional western redcedar.

These islands provide little of the grassy slope habitat which characterizes many islands having seabird colonies. The common seabirds here, fork-tailed storm-petrel (about 4,500 pairs), Leach's storm-petrel (8,000 pairs), ancient murrelet (over 15,000 pairs), and Cassin's auklet (over 10,000 pairs), nest in burrows on the forest floor. They occur on all four islands. On Rankine Island, ancient murrelets nest over most of the island except the coastal fringe and furthest interior forest. These birds nest in burrows at the base of old spruce trees in climax mossy woods. The slope of nesting sites varies from 0 to 60%. Cassin's auklet and petrel burrows usually occur within 30 m of the shoreline, in more open forest with some blow-down. A few pigeon guillemots nest in rock rubble or driftwood around the shorelines. Additional nesting birds include bald eagles and peregrine falcons.

OUTSTANDING FEATURES: This is one of the few reserves with sizeable populations of ancient murrelets and both species of storm-petrels.

OTHER INFORMATION: Order-in-Council no. 1826, 29 May 1973. Application no. 30 and 98. Map no. 103 B/6. Marine chart no. 3809; 3853. Accessible by boat but closed to the public by Order-in-Council (no. 1920, 16 June 1977).


131° 11'
131° 03'
52° 21'
52°15'
1 0 1 2 3 4 km
QUEEN CHARLOTTE ISLANDS
STRAIT
COPPER ISLANDS
SKINCUTTLE INLET
HUSTON INLET
MORESBY ISLAND
PROVINCIAL FOREST
East Copper Island
Jeffrey Island
George Island
Rankine Islands
New England Rocks
Joyce Rocks
Deluge Point
Ikeda Point
Ikeda Cove
Collison Bay
Cone Point
Nest Islets
Goodwin Point
Harriet Harbour
Rock Islet
Slug Islet
Bolkus Islands
1000
1500
100

SCALE 1:60000

ECOLOGICAL RESERVE No. 44
EAST COPPER / JEFFREY / RANKINE ISLANDS

N.T.S. No. 103 B/6

V.J. KRAJINA (PORT CHANAL) E.R. #45

PURPOSE: To protect representative ecosystems, rare genetic resources, and outstanding biological phenomena in a remote coastal setting

LOCATION: Middle west coast of Graham Island, Queen Charlotte Islands, 35 km W of Juskatla

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SIZE: 9,834 ha LAT: 53°31' - 53°38'N LONG: 132°45' - 133°01'W
ELEVATION: -125 to 825 m

BIOGEOCLIMATIC ZONES: Coastal Western Hemlock; Mountain Hemlock

PHYSICAL FEATURES:

Located on the west slope of the Queen Charlotte Ranges, the reserve includes mountainous terrain to 825 m in elevation, 60 km of marine shoreline, two large islands, and a fjord (Port Chanal). Slopes facing the inlet are steep, while moderate to flat terrain occurs on the outer two-thirds of the peninsula between Port Chanal and Nesto Inlet and along Mace Creek. Shorelines are mostly steep and rocky with exposed headlands and frequent cliffs. Beaches of shingle and mud occur at the head of Port Chanal at the mouth of Mercer Creek.

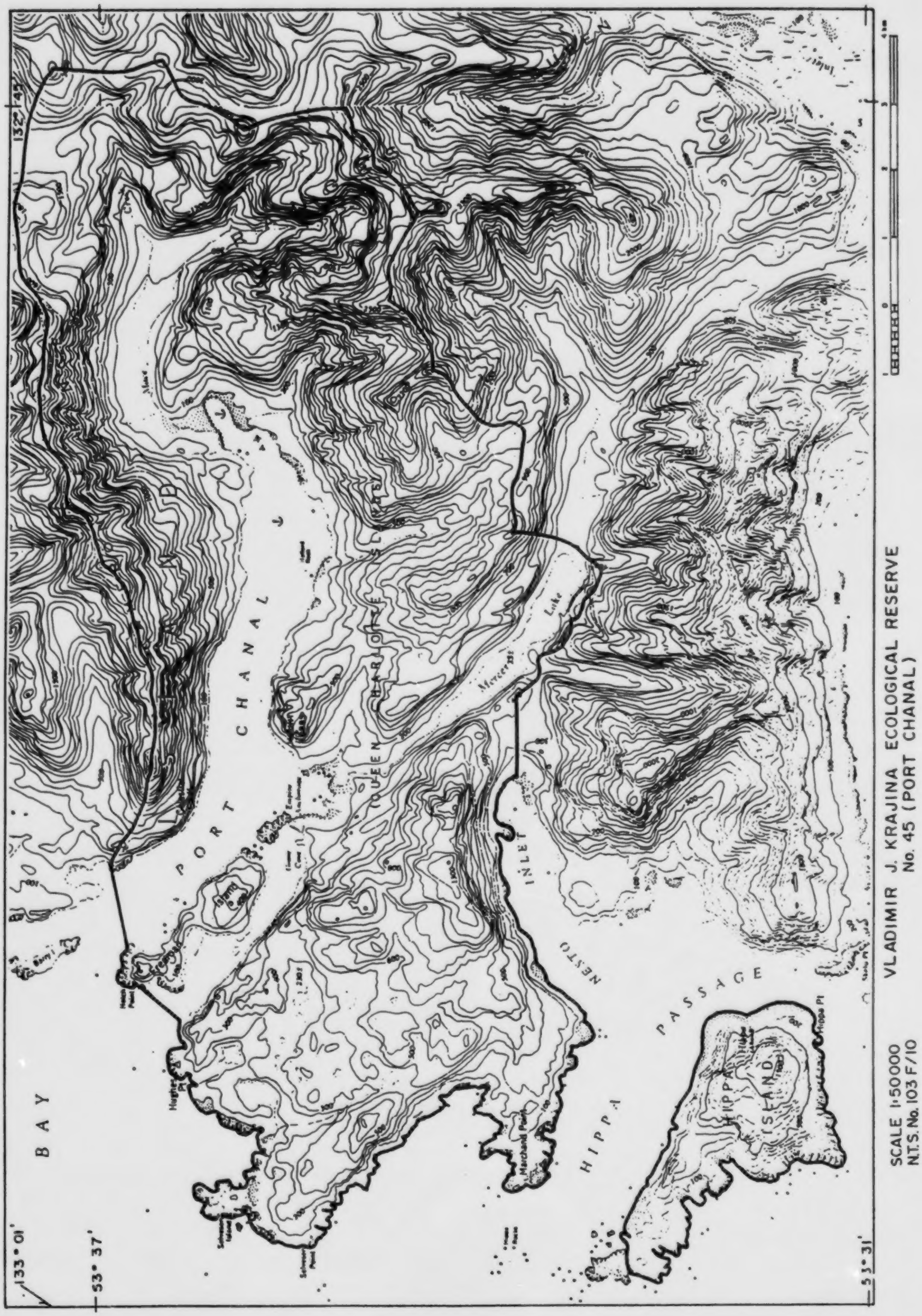
Surficial materials include extensive colluvium on steep slopes, lesser areas of till on gentle slopes and alluvium in valley bottoms, plus organic materials and marine deposits. Soils of the forested slopes are mainly Podzols of moderate depth and medium to coarse texture. Regosols and Gleysols occur on floodplains and Organic soils in the boggy areas.

Included are one relatively large lake (Mercer Lake), several small lakes (one on Hippa Island), the entire watershed of Mace Creek, and several minor creeks.

BIOTIC FEATURES:

Plant communities in the reserve reflect its diverse topography, substrates, and climate. Old-growth coniferous forest with mossy understory predominates, but barren headlands, estuarine meadows, bogs, and alpine habitats are present. The coniferous forest too, shows remarkable variation in composition and form over short distances, from luxuriant almost pure stands of huge Sitka spruce in sheltered valleys, to more typical western hemlock dominated lower slopes, mountain hemlock - yellow cedar - shore pine forest in the subalpine zone (this often being of krummholz form at its upper margin), and finally barren alplands which may extend to unusually low elevations.

Spruce-dominated forest is largely in Mace Creek valley, the next valley to the south, and at the head of Mercer Lake. On alluvial sites these magnificent trees, up to 3 m in diameter, have a very open, grassy, understory containing Pacific reedgrass, Alaska oniongrass, nodding trisetum, and false lily-of-the-valley. The more widespread western hemlock - western redcedar forest contains scattered Alaskan blueberry and red huckleberry shrubs, occasional deer fern, and a nearly continuous ground


133° 01'
53° 37'
132° 49'
53° 31'
BAY
PORT CHANAL
QUEEN CHARLOTTE
Mercer Lake
INLET
NESTO
HIPPA PASSAGE
HIPPA ISLAND
Hippa Pt
Hughes Pt
Marchand Pt

VLADIMIR J. KRAJINA ECOLOGICAL RESERVE
No. 45 (PORT CHANAL)

SCALE 1:50000
N.T.S. No. 103 F/10

cover of mosses. Higher elevations and boggy sites support less-vigorous mixtures of yellow cedar, mountain hemlock, and shore pine, with ground cover of sphagnum moss, sedges, and other wetland plants. Interesting blanket bogs, typically on sloping ground and interrupted by rock outcrops, are common on the western peninsula.

Plant communities of the Mace Creek estuary demonstrate typical zonation related to salt tolerance and degree of tidal inundation. A small area of Pacific reedgrass occurs in the fresh water-dominated upper marsh, a more extensive meadow barley - red fescue association in the upper to middle zone, Lyngbye's sedge stands in the mid-intertidal area, and dwarf alkaligrass in the lower zone.

To date over 130 species of higher plants have been identified here, including several having forms endemic to the Queen Charlottes or rare in the province. The area is particularly rich in liverworts and mosses, 180 species having been recorded, of which no less than 40 are presently considered by experts to be rare. The reserve is the type location for two species of sphagnum moss new to science, Sphagnum schofieldii and S. wilfii.

Hippa Island supports large nesting colonies of ancient murrelets and Cassin's auklets. The murrelets (40,000 pairs) nest in greatest densities along the northeast coast, up to 500 m inland in mossy old-growth spruce forests. The auklets (12,500 pairs) prefer grassy, semi-open spruce stands within 60 m of the shoreline, along the northwest coast. A few pigeon guillemots and black oystercatchers nest around the shoreline, and several breeding pairs of bald eagles and peregrine falcons are present. Elsewhere in the reserve, Canada geese and green-winged teal frequent Empire Anchorage and Mace Creek estuary, while the forests are home to three endemic birds, the Queen Charlotte Island sub-species of saw-whet owl, Steller's jay, and hairy woodpecker.

All land mammals native to the Queen Charlottes are expected to occur in the reserve. About 300 Steller sea lions used Hippa Island as a winter haul-out; harbour seals are common year round.

Four species of Pacific salmon spawn here. The Mercer Lake system is important for up to 8000 sockeye whose young spend a year in the lake as smolts. Pink salmon also spawn in Mercer Creek, and coho and chum salmon in both Mercer and Mace Creeks.

OUTSTANDING FEATURES: Exceptional park-like stands of Sitka spruce occur, interesting blanket bogs, and a complete estuary. The liverwort and moss flora is exceptionally diverse, and several rare and/or endemic species or varieties of vascular plants and bryophytes occur. Faunal features include spawning runs of four species of salmon, large seabird colonies, nesting peregrine falcons, a sea lion haul-out, and the presence of all endemic races of birds and mammals known to occur in the Queen Charlotte Islands.

OTHER INFORMATION: Order-in-Council no. 1827, 29 May 1973. Application no. 23. Map no. 103 F/10. Marine chart no. 3860; 3863; 3869. Accessible by boat or float plane. Reports and lists are available on marine flora and fauna; forest, bog, and estuary vegetation; and seabird surveys.

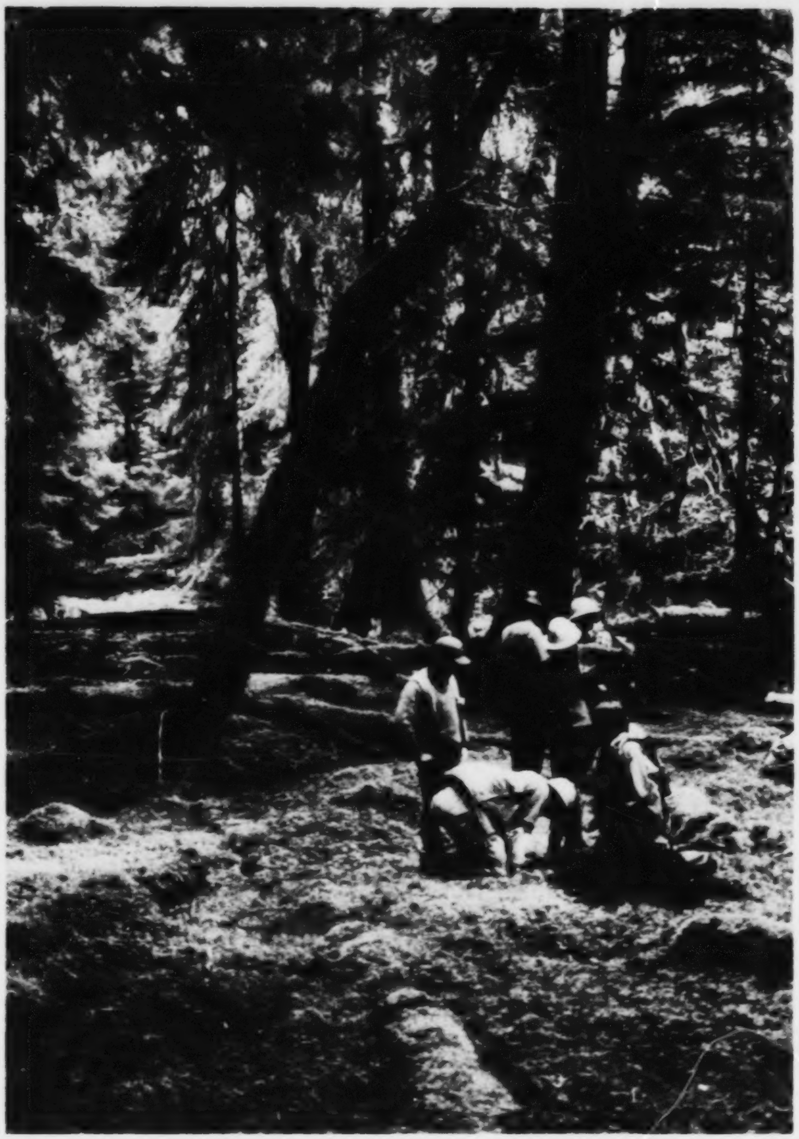


Figure 6. Educational Use of Ecological Reserves

Ecological reserves protect lands which are suitable for scientific research and educational purposes associated with studies in productivity and other aspects of the natural environment. Here, forest ecologists are trained in the interpretation of forest soils in the Vladimir Krajina Reserve (#45) on Graham Island. An important aspect of ecological reserves is their permanence. "Type-specimens" of specific ecosystems are protected in reserves and can be used repeatedly over the decades for long-term studies by researchers and educators. (Photo J. Pojar)

SIKANNI CHIEF RIVER E.R. #46

PURPOSE: Conservation of alpine - subalpine ecosystems representative of the northern Rocky Mountains

LOCATION: Headwaters of Sikanni Chief River, 190 km NW of Hudson's Hope

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SIZE: 2,401 ha LAT: 57°17'N LONG: 124°07'W ELEVATION: 1525 - 2745 m

BIOGEOCLIMATIC ZONES: Spruce - Willow - Birch; Alpine Tundra

PHYSICAL FEATURES:

Featuring spectacular alpine terrain in the heart of the northern Rockies, this triangular reserve encloses the watersheds of two small streams which flow southwestward into Sikanni Chief Lake at the extreme headwaters of the Sikanni Chief River. Reserve boundaries follow heights of land except the southwestern (lower) edge which follows the 1524 m (5000 ft.) contour. The varied terrain includes jagged peaks, cliffs, talus slopes, rock ledges, and vegetated alpine slopes. Alpine features such as cirque basins, moraines, small alpine glaciers, solifluction lobes and patterned ground are present. Due to northern latitude, inland location, and high elevation, the climate is severe and the growing season short.

BIOTIC FEATURES:

The reserve encompasses two biogeoclimatic zones. A fringe below about the 1650 m level has extensive shrub cover and scattered trees characteristic of the Spruce - Willow - Birch Zone. Typical associations here are the grey-leaved willow - subalpine fir, and scrub birch - Engelmann spruce types. This is the northernmost known occurrence of Engelmann spruce in the Rocky Mountains. Small water sedge fens occur in the Spruce - Willow - Birch Zone, as well as lush timberline meadows dominated by Indian hellebore, cow-parsnip, and willows.

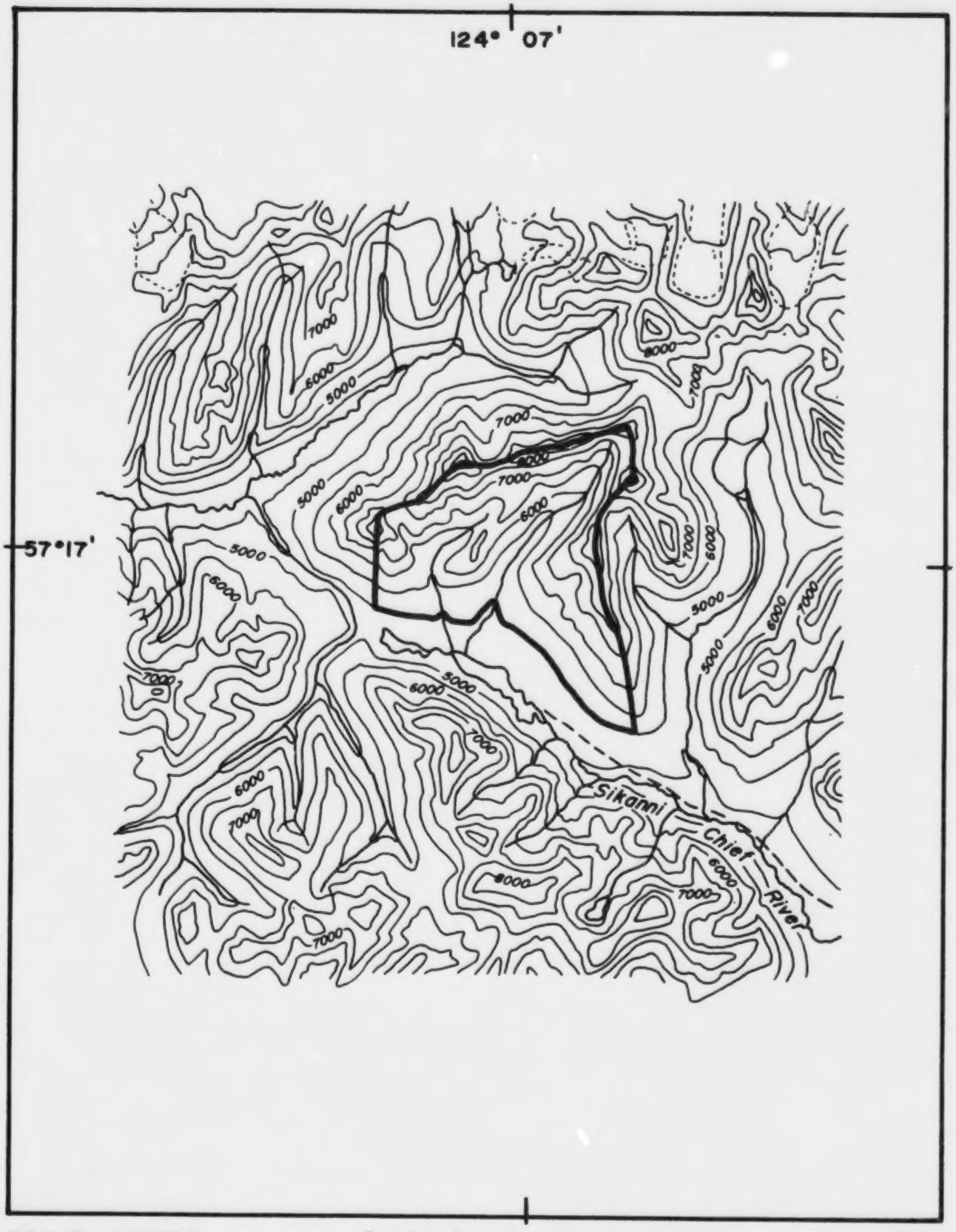
In the alpine zone, communities dominated by alpine club-moss, four-angled mountain-heather, netted willow, arctic willow, Barratt's willow, fireweed, white mountain-avens, and black alpine sedge have been noted. Showy wildflowers include saxifrages, fleabanes, and butterweeds.

Caribou, moose, hoary marmots, and chipmunks have been seen in the reserve. Excellent habitat is present for Stone's sheep, mountain goats, grizzly bears, golden eagles, ptarmigan and a variety of other arctic-alpine wildlife.

OUTSTANDING FEATURES: The reserve contains a variety of alpine plant communities and wildlife species in a pristine environment.

OTHER INFORMATION: Order-in-Council no. 1828, 29 May 1973. Application no. 81. Map no. 94 F (1:125,000) and 94 F/8 (1:50,000). Access by float plane to Sikanni Chief Lake followed by 1 km uphill walk to reserve boundary.

2-46B


124° 07'
57°17'
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Sikanni
Chief
River
6000
7000
8000
7000

SCALE 1:125000

2 1 0 5 10km

N.T.S. No. 94 F

ECOLOGICAL RESERVE No. 46
SIKANNI CHIEF

PARKER LAKE

E.R. #47

PURPOSE: To protect northern bogland containing populations of three plants that are very rare in British Columbia

LOCATION: S side of Parker Lake, 10 km W of Fort Nelson

SIZE: 259 ha LAT: 58°49'N LONG: 122°54'W ELEVATION: 385 m

BIOGEOCLIMATIC ZONE: Boreal White and Black Spruce

PHYSICAL FEATURES:

The reserve lies on a flat, boggy lowland within the Alberta Plateau. Low hills rise one or two kilometers to the north and Pouce Creek to the south has cut a channel into the lowland surface, but the entire square-mile reserve is level and boggy with no organized drainage pattern. Four small shallow lakes, 5 to 12 ha in size, lie in the northeast quarter of the reserve.

This area was glaciated by the Keewatin rather than Cordilleran ice sheet, and ice movement, to the west and southwest, resulted in a veneer of glacial drift. The land surface of the reserve has been little modified since the glacial period.

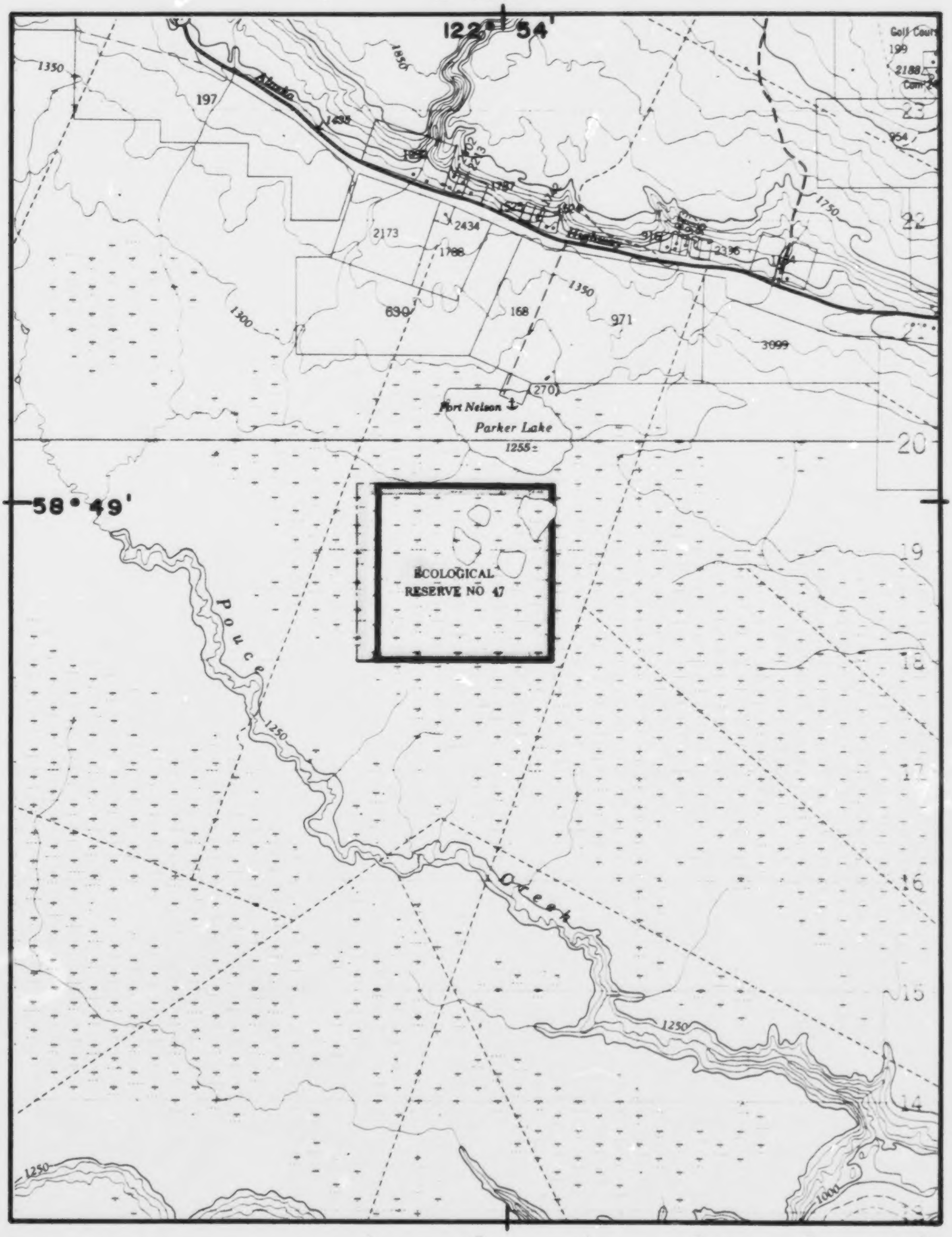
Soils developed on the glacial drift are entirely organic and result from accumulation of dead plant material such as sphagnum moss and sedges. This material breaks down slowly in these cold, wet, environments. The moderately decomposed organic soils associated with shrub-sedge habitats in the reserve are called Mesisols, the poorly decomposed materials characteristic of black spruce - sphagnum sites are classified as Fibrisols. The organic layer is fairly thin but serves as a hugh sponge which regulates streamflow by holding and slowly transmitting vast quantities of water. Topographic maps indicate that streams surrounding the reserve mostly radiate away from it, therefore recharge of the wetlands is mostly by rainfall and snowmelt. Since there is no import of dissolved minerals into them they tend to be nutrient-poor.

The climate is characterized by long cold winters and short warm summers, moderated to a minor extent by low elevation. The mean monthly temperature of -1.3°C places this reserve just inside the southern boundary of discontinuous permafrost, defined by the -1°C annual isotherm.

BIOTIC FEATURES:

Of great interest here is the occurrence of three species of wetland plants which have been placed in the category of greatest rarity for British Columbia flora. All are restricted to the Alberta Plateau - Rocky Mountain Foothills area of extreme northeastern British Columbia, and none have been collected in more than three locations.

2-47 B


122° 54'
58° 49'
Alaska Highway
Fort Nelson
Parker Lake
1255±
ECOLOGICAL RESERVE NO 47
Pouce Creek
1350
1300
1250
1000
1750
197
2173
2434
1788
630
168
971
3099
2396
(270)
Golf Course
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20
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17
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SCALE 1:50 000
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N.T.S. No. 94 J/15

ECOLOGICAL RESERVE No. 47
PARKER LAKE

The first discovery of Mackenzie's water-hemlock (Cicuta mackenzieana was made in E.R. 47; one additional collection has been made south of Dawson Creek. This northern species occurs from Alaska to Quebec. In the reserve it grows in lake edge communities with sedges and cotton-grass. The reserve is one of only two British Columbia localities where the striking, carnivorous, common pitcher plant (Sarracenia purpurea) is known to occur. The other site is not far away. This species occurs from the Northwest Territories to Newfoundland. In the reserve it is commonly associated with cotton-grasses, scheuchzeria, and seaside arrow-grass. The third species, Pedicularis macrodonta, is a lousewort which ranges from Alaska to Quebec but is also rare in Yukon Territory and Alberta.

Wetland communities in the reserve are diverse for this latitude and exhibit a wide range of successional stages from pondweed associations in shallow lakes to bog forest. Shallows in the lakes are dominated by submerged and floating-leaved macrophytes such as pondweeds of the Potamogeton group, and yellow waterlily. Emergent marsh communities occur in shallow waters at lake edges. These include virtually pure stands of cattail, as well as associations in which beaked sedge and wild calla (water arum) are abundant. Fen communities surrounding the lakes may be characterized by an association of cotton-grass, common pitcher plant, scheuchzeria, and seaside arrow-grass or by sedges, cotton-grass and buckbean.

Transitional areas between fen and bog forest are characterized by scrub birch cover and scattered tamarack trees. Associated plants include buckbean, dwarf bog cranberry, leatherleaf, sedges, ribbed bog moss, and sphagnum moss. Two black spruce bog communities have been noted.

Parker Lake, adjacent to but not in the reserve, has been the site of several bird surveys and 83 species have been noted in summer, among which waterfowl and shorebirds are notably diverse. Most of the same species probably occur in the reserve. Black terns, perhaps 20 pairs, are known to nest within the reserve, this being one of the northernmost colonies in the province. Other species seen in the reserve and probably nesting there include Bonaparte's gull, white-winged scoter, ring-necked duck, greater yellowlegs, solitary sandpiper, rusty blackbird, and red-winged blackbird.

OUTSTANDING FEATURES: The reserve contains three of the rarest plants in British Columbia; diverse shallow lake, fen, and bog communities; and an array of wetland birds including a nesting colony of black terns. This is an ideal site to study succession in northern wetland plant communities.

OTHER INFORMATION: Order-in-Council no. 1829, 29 May 1973. Application no. 109. Map no. 94 J/15. Best access is by road to Parker Lake and boat across the lake to the north edge of the reserve. Winter access is possible by foot across ice on Parker Lake or by snowmobile.

The reserve is so boggy that travel through it is almost impossible in summer. Except for one north-south seismic line through the middle of the reserve the site is in a natural state.

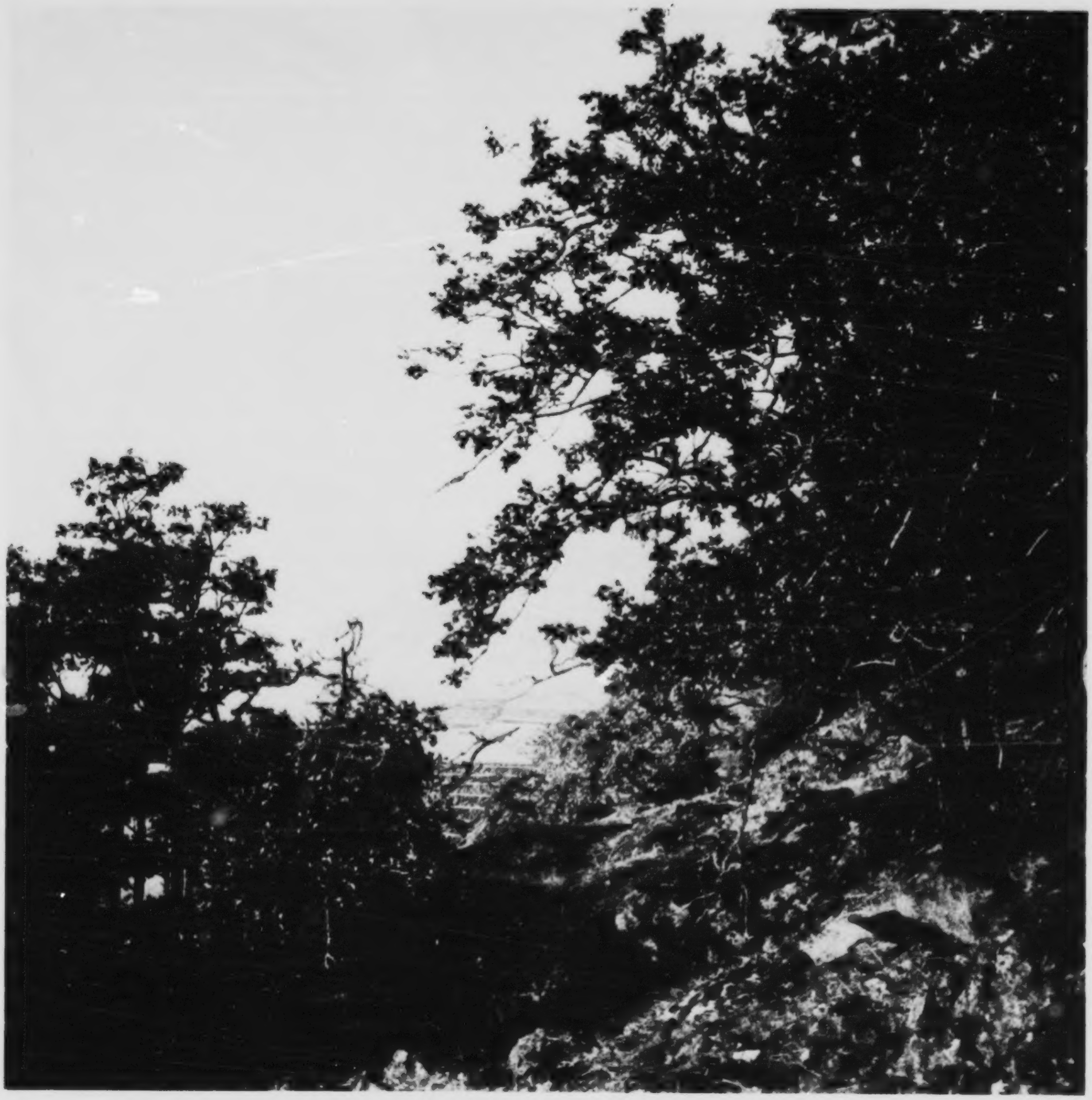


Figure 7. Protection of Rare Plant Communities in the Mount Maxwell Ecological Reserve (#37)

Garry oak stands are a representative element of the southern Vancouver Island vegetation. However, expanding urban development has eliminated much of their natural habitat and Garry oak communities are becoming increasingly rare. Two examples of such communities are protected in the Mount Maxwell (see photo) and Mount Tzuhalem (#112) Ecological Reserves. (Photo H. Roemer)

BOWEN ISLAND E.R. #48

PURPOSE: Preservation of dry subzone forest ecosystems in the Coastal Western Hemlock Zone at a location convenient for research

LOCATION: 2 km SW of Snug Cove, Bowen Island, Howe Sound

SIZE: 397 ha LAT: 49°22'N LONG: 123°21'W ELEVATION: 75 - 480 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

The reserve straddles a southwest-northeast trending ridge. Most of its area is on the rolling summit of the ridge above 300 m in elevation but steep slopes occur along the northwest and southeast edges. Bedrock is mostly granitic diorite and greenstone of the Bowen Island formation. Rocky outcrops are common; soils, mostly Podzols, are thin and well drained. South facing slopes are quite dry.

BIOTIC FEATURES:

Except for one swamp and some rock outcrops, the reserve is entirely forested. Forest stands have mostly originated since a fire about 1920, although a few older stands and veteran trees are present. Although a great diversity of tree species occurs, Douglas fir forest is dominant over most of the area. At least seven Douglas fir associations have been noted. In these, red alder is the most common subdominant tree, and understory species vary with moisture and soil development. The two associations of greatest extent are the Douglas fir - salal - moss (Stokesiella oregana) and Douglas fir - tall Oregon-grape - licorice fern types. Sword fern and three-leaved foamflower are characteristic understory species in some locations, and Wallace's selaginella and lichens in others. Less extensive areas dominated by lodgepole pine, western hemlock, and western redcedar are present, among which the cedar - Sitka spruce - skunk cabbage - sedge type is noteworthy. Other trees in the area include grand fir, bigleaf maple, arbutus, flowering dogwood, bitter cherry, and cascara.

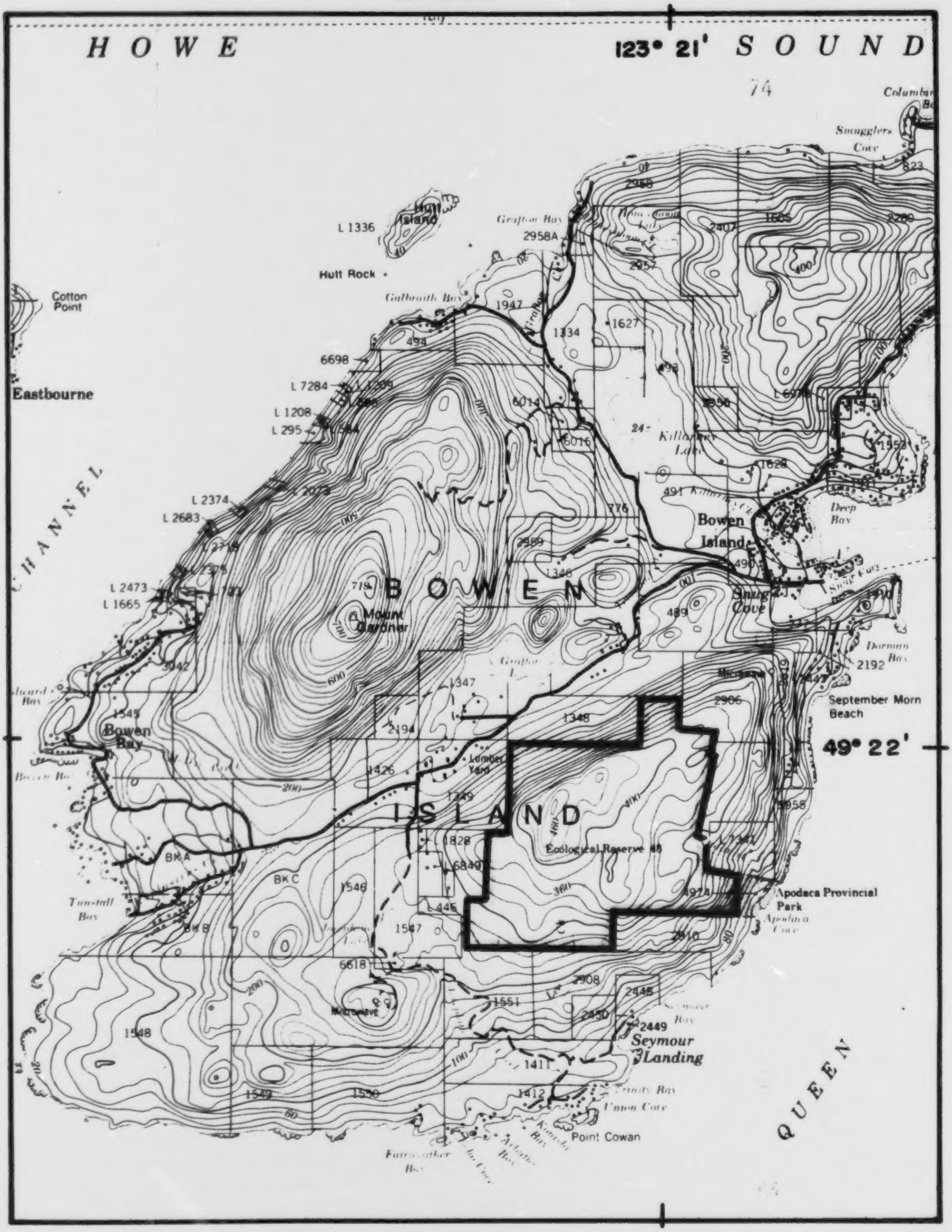
Geological factors are believed to result in excellent growth of Douglas fir here in a zone which climatically should favor western hemlock.

Amphibians recorded here are the northwestern salamander and Pacific treefrog. Black-tailed deer and Douglas squirrels are present, while deer mice, Townsend voles and shrews should occur, based on their known presence on Bowen Island. Birds have not been inventoried.

OUTSTANDING FEATURES: Relatively extensive and diverse un-logged forest stands in a location convenient for research on tree species and forest ecology.

OTHER INFORMATION: Order-in-Council no. 1830, 29 May 1973. Application no. 95. Map no. 92 G/6. Access by road to northwest and southeast corners of the reserve.

Lists of vascular plants and bryophytes are available.


HOWE
123° 21'
SOUND
Columbia Bay
Smugglers Cove
Grafton Bay
Hutt Island
L 1336
Hutt Rock
Cotton Point
Galbraith Bay
Eastbourne
CHANNEL
BOWEN
ISLAND
Mount Gardner
Killarney Lake
Bowen Island
Snug Cove
Deep Bay
Dorman Bay
September Morn Beach
49° 22'
Bowen Bay
Lumber Yard
Ecological Reserve 48
Apodaca Provincial Park
Apodaca Cove
Tunstall Bay
Microwave
Seymour Bay
Seymour Landing
Trinity Bay
Union Cove
Point Cowan
Fairweather Bay
QUEEN

SCALE 1:50 000

N.T.S. No. 92 G/6

ECOLOGICAL RESERVE No. 48
BOWEN ISLAND

KINGFISHER CREEK E.R. #49

PURPOSE: Retention of representative subalpine parkland in an area transitional between dry and wet interior climates

LOCATION: 14.5 km ESE of Sicamous

SIZE: 1,441 ha LAT: 50°48'N LONG: 118°47'W ELEVATION: 1175 - 2135 m

BIOGEOCLIMATIC ZONE: Engelmann Spruce - Subalpine fir

PHYSICAL FEATURES:

The reserve is situated on the rolling crest of the Hunters Range. This range, within the Shuswap Highland, is bounded on the north by Eagle River, east by Wap Creek and Mabel Lake, and south and west by Shuswap River. Except for a sharp ridge in its extreme southwest corner, the western half of the reserve consists of rolling terrain between the 1675 and 2000 m elevations. Kingfisher Creek valley, trending north to south, occupies most of the eastern half of the reserve. The steepest slopes in the reserve are along this valley. Kingfisher Creek empties into Shuswap River.

BIOTIC FEATURES:

The major feature of interest in this reserve is an extensive area of subalpine parkland typical of the uppermost subzone of the Engelmann Spruce - Subalpine Fir Zone. This is best represented above the 1700 m elevation where the forest becomes open, the openings becoming larger and the trees increasingly stunted into windblown krummholz islands as one approaches the maximum reserve elevation of 2135 m. Meadows between the tree clumps contain many alpine plants but there are no sizeable areas of completely treeless alpine tundra. Subalpine fir is the most common tree in the parkland area. Subalpine meadow communities are dominated by such species as pink, yellow and white mountain-heathers, wooly pussytoes, partridgefoot, western pasqueflower, Brewer's and five-stamened mitreworts, and black alpine sedge. Showy wildflowers in this area include Indian paintbrush, arnicas, glacier lilies, and larkspurs.

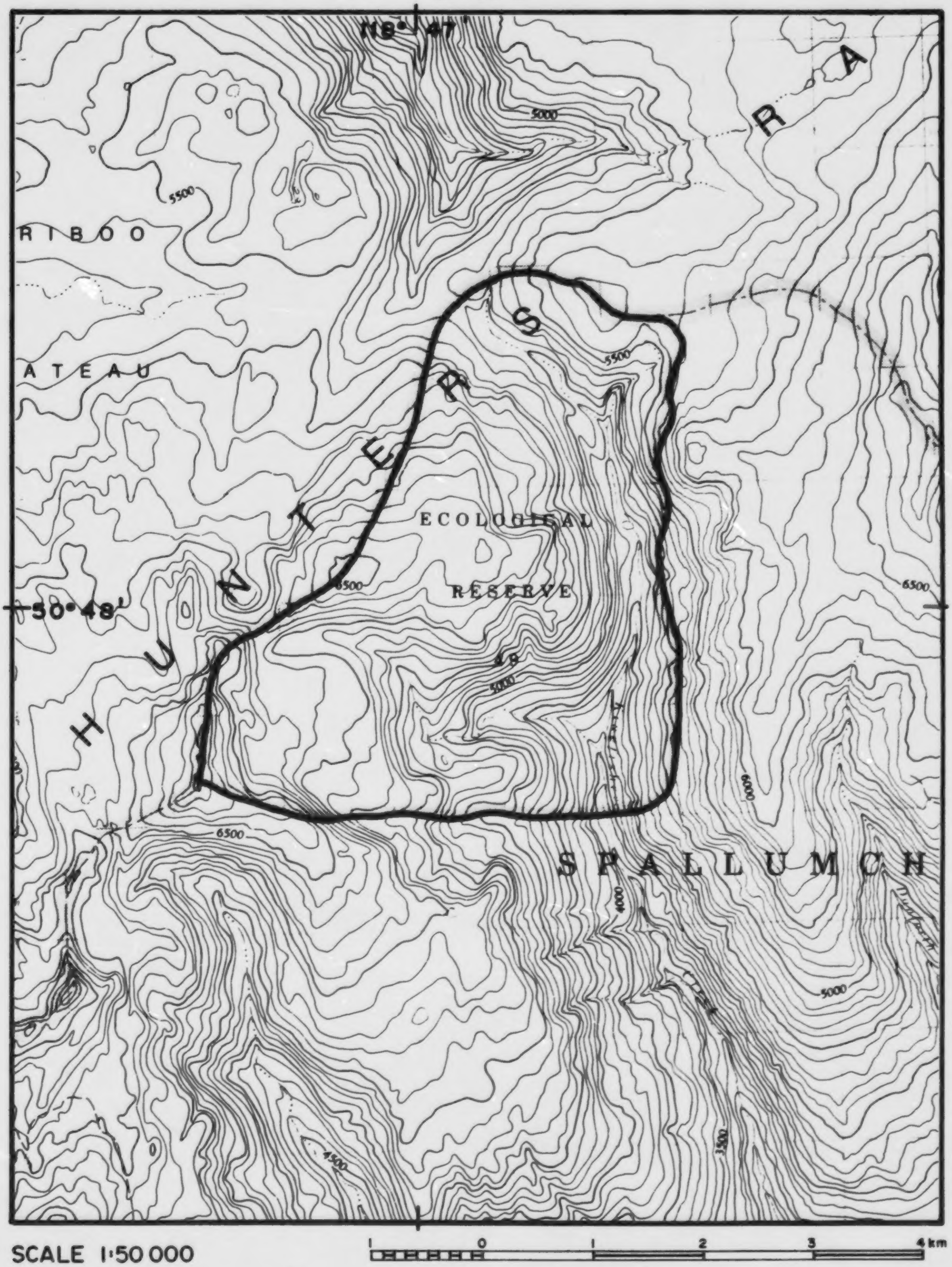
Typical Engelmann spruce - subalpine fir stands, with shrubs such as white rhododendron and black huckleberry in the understory, cover most lower elevations in the reserve except for a few rock outcrops and talus slopes. A finger of Interior Cedar - Hemlock forest barely enters the reserve in Kingfisher Creek Valley, below the 1370 m elevation.

The fauna has not been surveyed, although ruby-crowned kinglets, water pipits, and dark-eyed juncos have been noted.

OTHER INFORMATION: Order-in-Council no. 1964, 7 June 1973. Application no. 79. Map no. 82 L/15. Access via 4-wheel-drive track to meadows below Mount Mara lookout tower, followed by 3 to 4 km walk to the northeast.

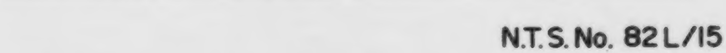
Despite the remoteness and high elevation of this reserve and the short growing season, some livestock grazing occurs here.

2-49 B



118° 47'
50° 48'
RIBOO
ATEAU
HUNTERS RA
ECOLOGICAL RESERVE
49
SPALLUMCH
5000
5500
6500
6000
4000
4500
3500

SCALE 1:50 000



N.T.S. No. 82 L/15

ECOLOGICAL RESERVE No. 49
KINGFISHER CREEK

CECIL LAKE E.R. #50

PURPOSE: Preservation of aspen, fen, and bog ecosystems representative of the Peace River area of the Alberta Plateau

LOCATION: 28 km NE of Fort St. John; 30 km W of the Alberta border

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SIZE: 129 ha LAT: 56°24'N LONG: 120°31'W ELEVATION: 710 - 720 m

BIOGEOCLIMATIC ZONE: Boreal White and Black Spruce

PHYSICAL FEATURES:

Local relief varies by only about 10 m in this flat to very gently rolling portion of the Alberta Plateau, underlain by shale and sandstone bedrock. Silty-clay surficial materials were deposited in the ice-dammed glacial Lake Peace which had shorelines up to the 810 m elevation. Soils developed on those surficial materials are largely grey Luvisols on the uplands and organic types in perennialy wet areas.

BIOTIC FEATURES:

The reserve contains a mosaic of trembling aspen forest, shrubby fen, and black spruce bog vegetation types. Aspen woods, mostly in the northern half and southeastern corner, cover at least half of its area, and contain occasional white spruce. Willows and soopolallie are common understory shrubs; fireweed, bluejoint, creamy peavine, American vetch, bunchberry, heart-leaved arnica, northern bedstraw, wild strawberry, and tall bluebells are representative forbs. Shrub-dominated fens cover considerable area in the southwestern and east-central parts of the reserve. These are dominated by willows and scrub birch.

Fairly extensive bog forest here is dominated by black spruce, Labrador tea, cloudberry, and lichens, with considerable sedge and sphagnum moss in the wettest locations. Small areas of dense black spruce growth have an understory characterized by Labrador tea and horsetails, and lack sphagnum moss. Localized areas of sedge fen are present.

A variety of wildlife is present, including red-tailed and marsh hawks, gray jays, red squirrels, deer, and moose.

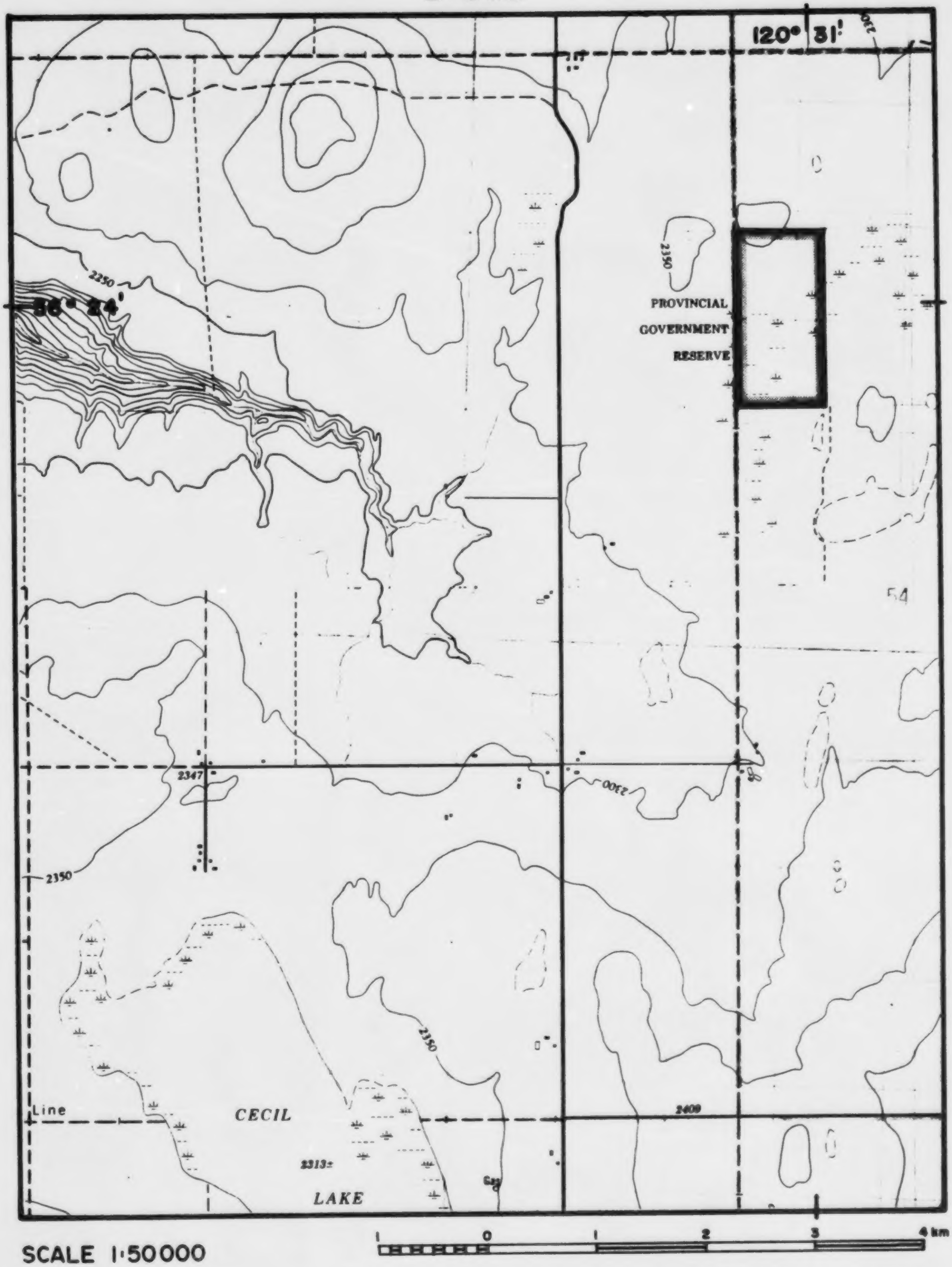
OUTSTANDING FEATURES: Aspen-dominated ecosystems of the northern Great Plains are limited in extent in British Columbia and have largely been converted to agriculture. Like E.R. #8, this reserve contains floral and faunal elements which extend into the province only in this area.

OTHER INFORMATION: Order-in-Council no. 2760, 10 August 1973. Application no. 34. Map no. 94 A/7. Access by road from Fort St. John via Cecil Lake.

Considerable farmland has been developed in the vicinity, some of which borders the reserve, and could ultimately affect its water regime.

A partial plant list is available.

2-50B


120° 31'
56° 24'
2250
2350
PROVINCIAL
GOVERNMENT
RESERVE
54
2347
2300
2350
2350
Line
CECIL
LAKE
2313±
2409
Gas
1 0 1 2 3 4 km

SCALE 1:50000

N.T.S. No. 94 A/7

ECOLOGICAL RESERVE No. 50
CECIL LAKE

BROWNE LAKE E.R. #51

PURPOSE: Preservation of wet meadow ecosystems and surrounding forest in the Interior Douglas Fir - Montane Spruce transition

LOCATION: 20 km ESE of Kelowna City Center

SIZE: 124 ha LAT: 49°49'N LONG: 119°12'W ELEVATION: 1265 - 1400 m

BIOGEOCLIMATIC ZONES: Interior Douglas Fir; Montane Spruce

PHYSICAL FEATURES:

The reserve lies on a hilly area of the Interior Plateau, east of Okanagan Lake, perched above the south lip of Mission Creek Valley. It contains a prominent hill in its eastern half and a wet meadow, which drains into Hydraulic Creek, in its rolling to flat western half. Slope exposure is largely to the west.

BIOTIC FEATURES:

Except for a wet meadow of 4 to 5 ha in size, the entire reserve is forested, mostly with dense stands of lodgepole pine originating after a fire 80 to 100 years ago. A few veteran Douglas firs and western larch are scattered through the area, and Douglas fir regeneration is co-dominant with lodgepole pine in the eastern part of the reserve. A stand of spruce, subalpine fir and larch is adjacent to the southeast corner of the meadow.

The meadow vegetation is dominated by water sedge, but the wettest locations contain slender sedge as well, and the bog rein-orchid is common. A peripheral zone is characterized by bluejoint and other grasses. Some weedy species occur as a result of former cattle grazing and hay cutting.

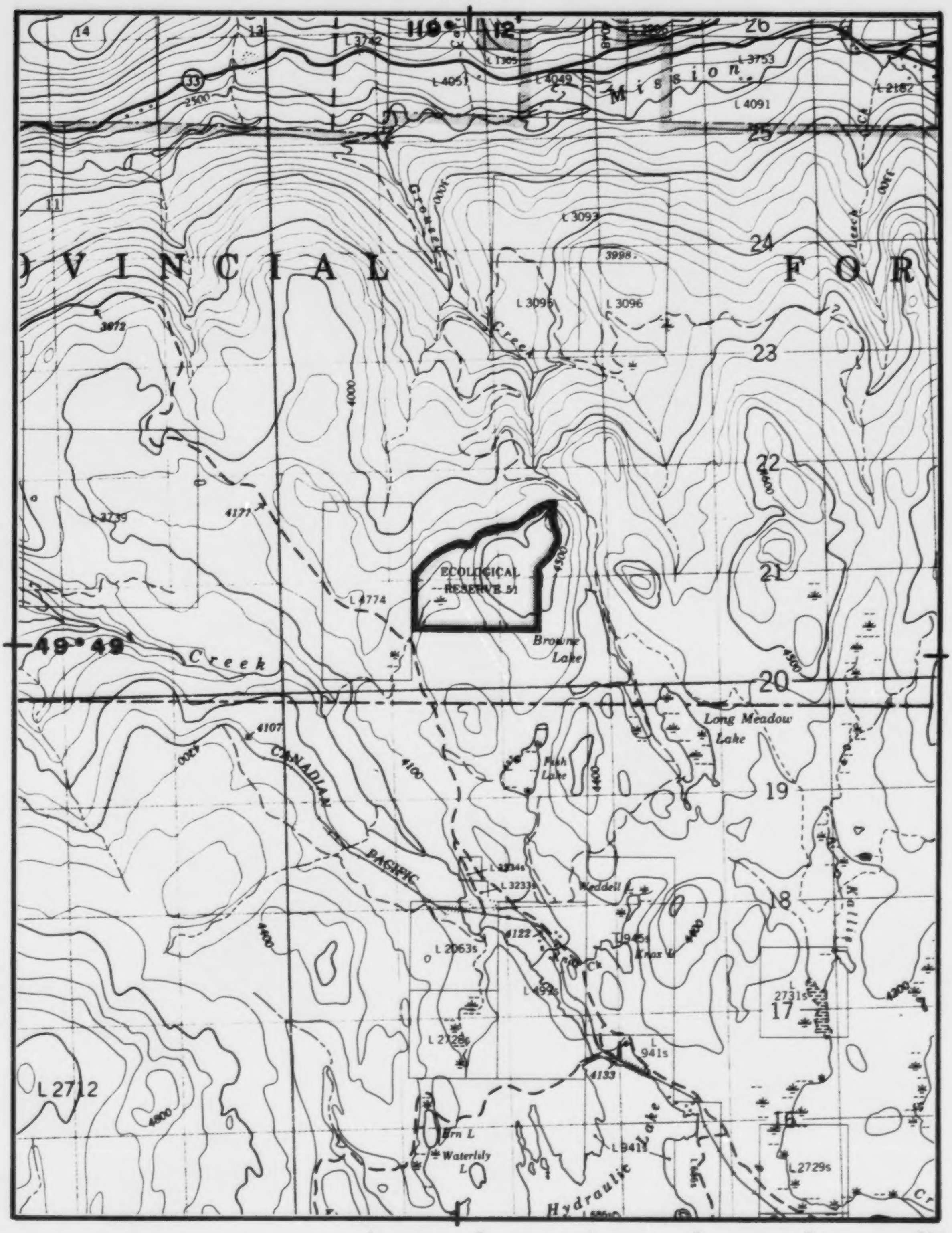
The reserve contains a diversity of wildflowers among which lilies (trillium, glacier lily, chocolate lily, tiger lily, queen's cup, fairybells, Solomon's-seal, clasping twistedstalk) and orchids (mountain lady's-slipper, fairy-slipper, coralroot, rattlesnake-plantain, rein-orchid) are well represented. The mountain lady's-slipper (Cypripedium montanum) is considered rare in British Columbia. Interesting spring flowers, including alpine Lewisia and shooting star, occur on shallow soils and in mossy sites associated with rock outcrops and seepage near the upper boundary of the reserve.

Deer, moose, beaver, red squirrels, flying squirrels, porcupines and coyotes have been noted. Ducks occur on a beaver pond at the southwest corner of the meadow, especially during the nesting season.

OTHER INFORMATION: Order-in-Council no. 2761, 10 August 1973. Application no. 112. Map no. 82 E/14. The McCulloch Road from Kelowna gives access to the southwest corner of the reserve.

Reserve boundaries are presently being exposed by adjacent clear-cuts. Some of this logging is to control the mountain pine beetle in surrounding lodgepole pine stands. Unlogged forest inside the reserve provides an interesting control area, where the natural progression of the infestation may be observed.

2-51B



119° 12'
49° 49'
ECOLOGICAL RESERVE 51
Browne Lake
Long Meadow Lake
Fish Lake
Weddell L
Knox L
Brn L
Waterlily L
Hydraulic Lake
Grouse Creek
Creek
Mission
CANADIAN PACIFIC
VINCIAL
FOR
L 4774
L 3739
L 3095
L 3096
L 3097
L 4051
L 4049
L 4091
L 3753
L 2182
L 2063s
L 2728s
L 2712
L 2731s
L 2729s
L 941s
3998
4177
4107
4122
4133
3872
26
25
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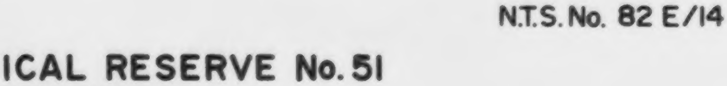
13
11

SCALE 1:50000



N.T.S. No. 82 E/14

ECOLOGICAL RESERVE No. 51
BROWNE LAKE

DRIZZLE LAKE

E.R. #52

PURPOSE: To maintain undisturbed lake and bog ecosystems on the Argonaut Plain, Queen Charolotte Islands, for research on unique stickleback populations and their predators

LOCATION: 10 km SSE of Massett on Graham Island

SIZE: 837 ha LAT: 53°56'N LONG: 132°04'W ELEVATION: 52 - 91 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

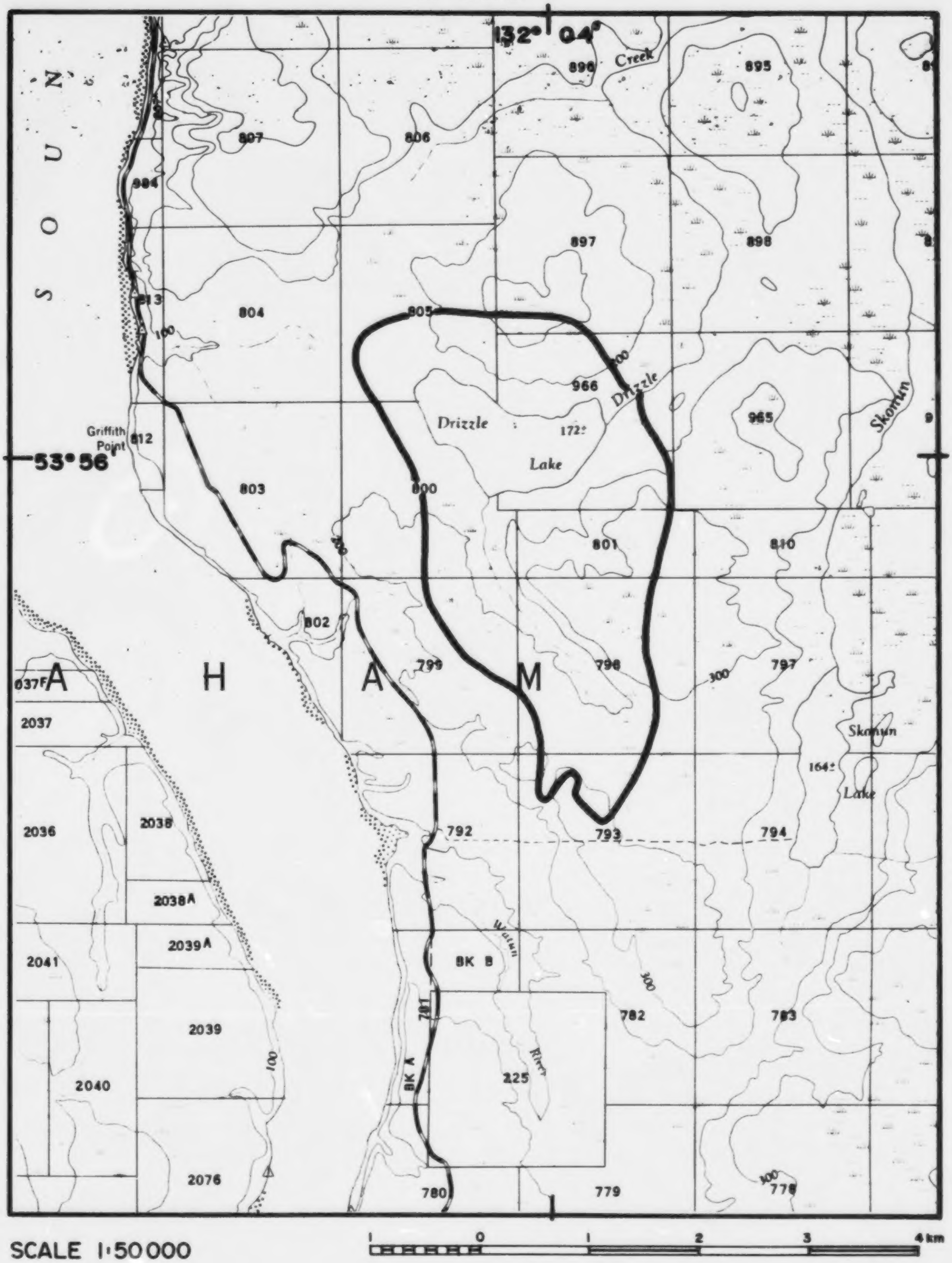
The reserve is located at the southwestern edge of the Argonaut Plan, a low-lying boggy subdivision of the Queen Charlotte Lowland. Soils are mostly saturated organic types (Fibrisols; Mesisols) developed by decay of sphagnum mosses and other bog plants. Forest soils (Podzols) occur on higher ground. Drainage on this low-relief surface is poorly organized. Drizzle Lake, 148 ha in area and 16 m deep, drains northward to Dixon Entrance via Drizzle Creek and the Skonun and Sangan Rivers. Reserve boundaries enclose all upstream drainage into Drizzle Lake. The relatively smooth lakebottom consists mostly of fine sand and hard-packed sand and gravel. Some pebble beaches occur around the shoreline, sometimes overhung by banks of peat.

BIOTIC FEATURES:

Plant communities here are arranged in a complex mosaic which varies according to wetness of the site. Five major habitats have been described, and transitional types also occur. Small areas of closed forest occur on the best drained sites, primarily around the shore of Drizzle Lake and along its inlet stream. Western hemlock and western redcedar are dominant trees in the closed forest. Open forest, usually on moist but not ponded gently sloping land, occupies about half of the reserve area.

Interesting bog habitats formed by compressed layers of dead sphagnum moss cover flat terrain on about one quarter of the reserve. These giant sponges are fed by rainfall, and drainage out of them is restricted by an underlaying layer of compressed sand and gravel. Sphagnum moss is the dominant bog vegetation; prostrate common juniper, "bonsai"-like pines, and dwarfed hemlocks and cedars are conspicuous but well-spaced. Indicator plants of the bogs include Alaska bentgrass, beak-rush, tufted deer-grass, cotton-grass, crowberry, bog rosemary, bog-laurel, alpine-azalea, bog blueberry, Labrador tea, sticky false asphodel, swamp gentian, and the insectivorous sundew. Bands of lakeshore vegetation commonly include several of the above bog plants, mosses, and Pacific reedgrass, as well as red alder and Pacific crab apple trees. Aquatic habitats cover nearly 20% of the reserve, much of this being Drizzle Lake itself. Due to poor light penetration, aquatic plants are not extensive in the lake. Western lilaeopsis is the only common submerged plant; various rushes and sedges grow sparingly as emergents.

2-52 B


132° 04'
53° 56'
S O U N
A H A M
Creek
Drizzle
Drizzle Lake
1722
Skonun
Skonun Lake
1642
Griffith Point
Wathun River
BK A
BK B
100
300
896
895
807
806
984
897
898
813
804
805
966
965
812
803
800
801
810
802
799
798
797
037F
2037
2036
2038
2038A
2039A
2041
2039
2040
2076
792
793
794
791
225
782
783
780
779
778
1
0
1
2
3
4 km

SCALE 1:50000

N.T.S. No. 103 F/16

ECOLOGICAL RESERVE No. 52
DRIZZLE LAKE

Seventy five species of vascular plants, 37 mosses, 6 liverworts, and 24 mushrooms have been recorded.

Drizzle Lake is noteworthy for the varied use made of it by at least 36 species of aquatic birds. These include migrants such as ducks and geese that are present for only a few days, seasonal residents like grebes which occur for up to 3 months, and itinerants like loons, cormorants, herons and gulls which make daily feeding flights to and from the ocean. Species accounting for most use in terms of bird-days are the mallard, Canada goose, common merganser, red-throated loon and common loon. Up to 60 common and 20 red-throated loons occur on Drizzle Lake in summer; most are non-breeding adults but a few red-throated loons nest on mossy hummocks near the shoreline. Feeding strategies of the loons show fascinating contrasts - common loons come from the ocean to feed on sticklebacks in the central part of the lake, with activity concentrated near mid-day; red-throated loons use shallower parts of the lake, mostly from early evening to dawn. Red-throated loons which nest on the lake make an average of 11 one-hour flights per day to the ocean to obtain spineless fish to feed their nestlings. Canada geese, mallards, green-winged teal, and hooded mergansers also nest in the reserve; great blue herons and marbled murrelets may do so.

All six endemic sub-species of Queen Charlotte Island mammals (river otter, short-tailed weasel, marten, black bear, dusky shrew, deer mouse) occur in the reserve as well as the introduced black-tailed deer, beaver, red squirrel, and raccoon. Two species of amphibians, the native western toad and introduced Pacific treefrog are also present.

Drizzle Lake and its inlet stream contain populations of the 3-spined stickleback fish that are of great scientific interest. The lake contains very large (up to 10 cm long), dark-coloured, long-spined specimens while inlet fish are much smaller, lighter coloured, and have short spines. Although these populations come into contact where the inlet stream enters the lake, hybrids have not been found. This degree of divergence, equivalent to that known across the entire circumboreal range of the species, is thought to have developed during the past 10,000 years, a remarkable rate of evolution. Large size, dark colour, and long spines in the lake-dwelling form have evolved as protection against predation by trout, and possibly loons. Other fish at Drizzle lake are dolly varden, cutthroat, and coho salmon.

OUTSTANDING FEATURES: Drizzle lake supports populations of a unique large stickleback fish found only in the Queen Charlotte Islands, nesting red-throated loons, and a diverse year-round assemblage of aquatic birds.

OTHER INFORMATION: Order-in-Council 2762, 10 August 1973. Application no. 106. Map no. 103 F/16. Accessible only by foot. The reserve boundary is .75 km from Highway 16; Drizzle Lake is 1.5 km away.

Several unpublished reports and journal papers by University of Alberta scientists are available on sticklebacks and loons. Research on those species is on-going. Other reports are available on the flora and on plant-insect relationships.

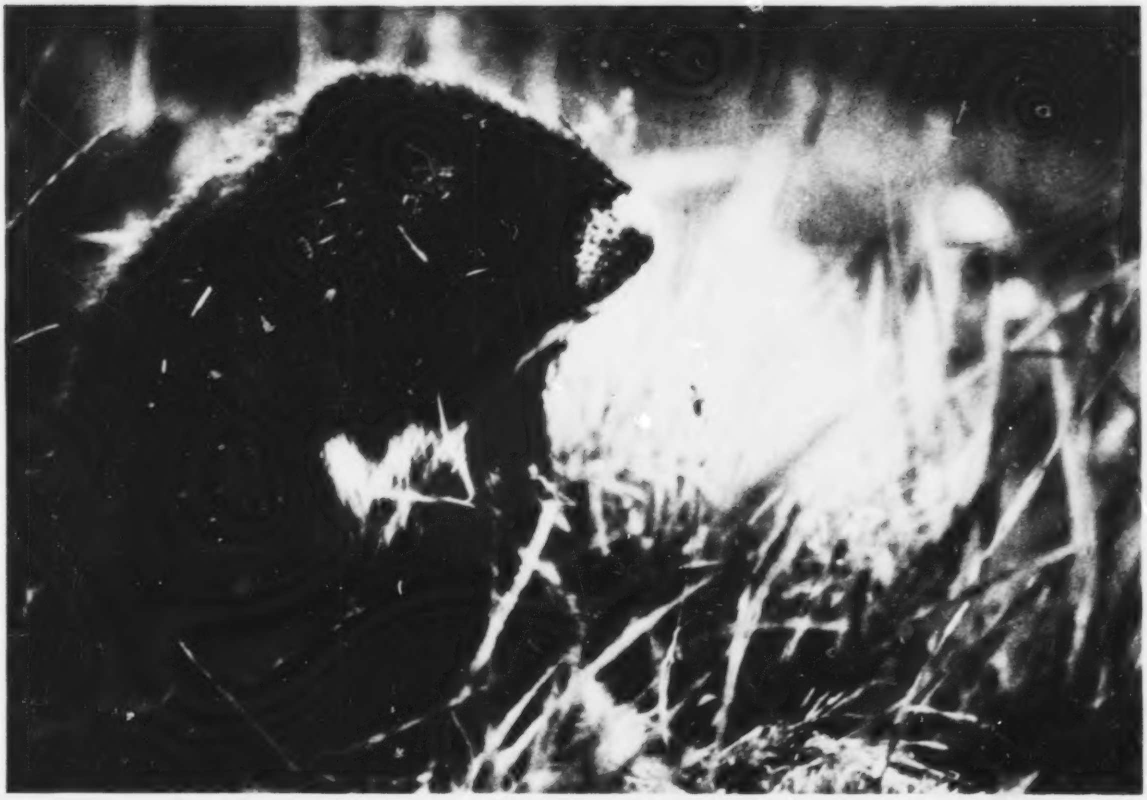


Figure 8. Protection of Rare and Endangered Animal Species in the Haley Lake Ecological Reserve (#117)

Rare or endangered animal species are protected in their natural ecosystems in a few ecological reserves. One of the most notable and at the same time the only rare and endangered animal endemic to British Columbia, is the Vancouver Island marmot. A population of these marmots is protected in the Haley Lake Ecological Reserve (#117) on Vancouver Island. This population has been repeatedly surveyed by the Wildlife Branch and has been the subject of numerous research theses. (Photo A. Bryant)

NARCOSLI LAKE E.R. #53

PURPOSE: To reserve a shallow, productive interior lake and adjacent wetland habitats for research purposes

LOCATION: 108 km W of Quesnel

SIZE: 1,098 ha LAT: 52°57'N LONG: 124°06'W ELEVATION: 1140 - 1190 m

BIOGEOCLIMATIC ZONE: Sub-boreal Spruce

PHYSICAL FEATURES:

The reserve lies in a shallow valley on the Interior Plateau. Lands around its northern end are very flat, while low hills rising to 1310 m flank the southern portion. Narcosli Lake, about 325 ha in area and 5 km long, is very shallow and divided by a narrows into two basins of approximately equal size. It is the central feature of the reserve, surrounded by a buffer of upland or wetland about 300 m in width. The lake drains northward via a meandering, low-gradient stream into Coglistiko River, a tributary of the Blackwater.

BIOTIC FEATURES:

The shallow lake, particularly its northern basin, has extensive submerged communities dominated by pondweeds of the genus Potamogeton and by water smartweed. Emergent stands of bulrush are also present. Most of the lake perimeter has a marshy shoreline. By far the most extensive wetland communities occur around the north end of the lake and along its outlet stream. These are dominated by sedges, particularly beaked sedge.

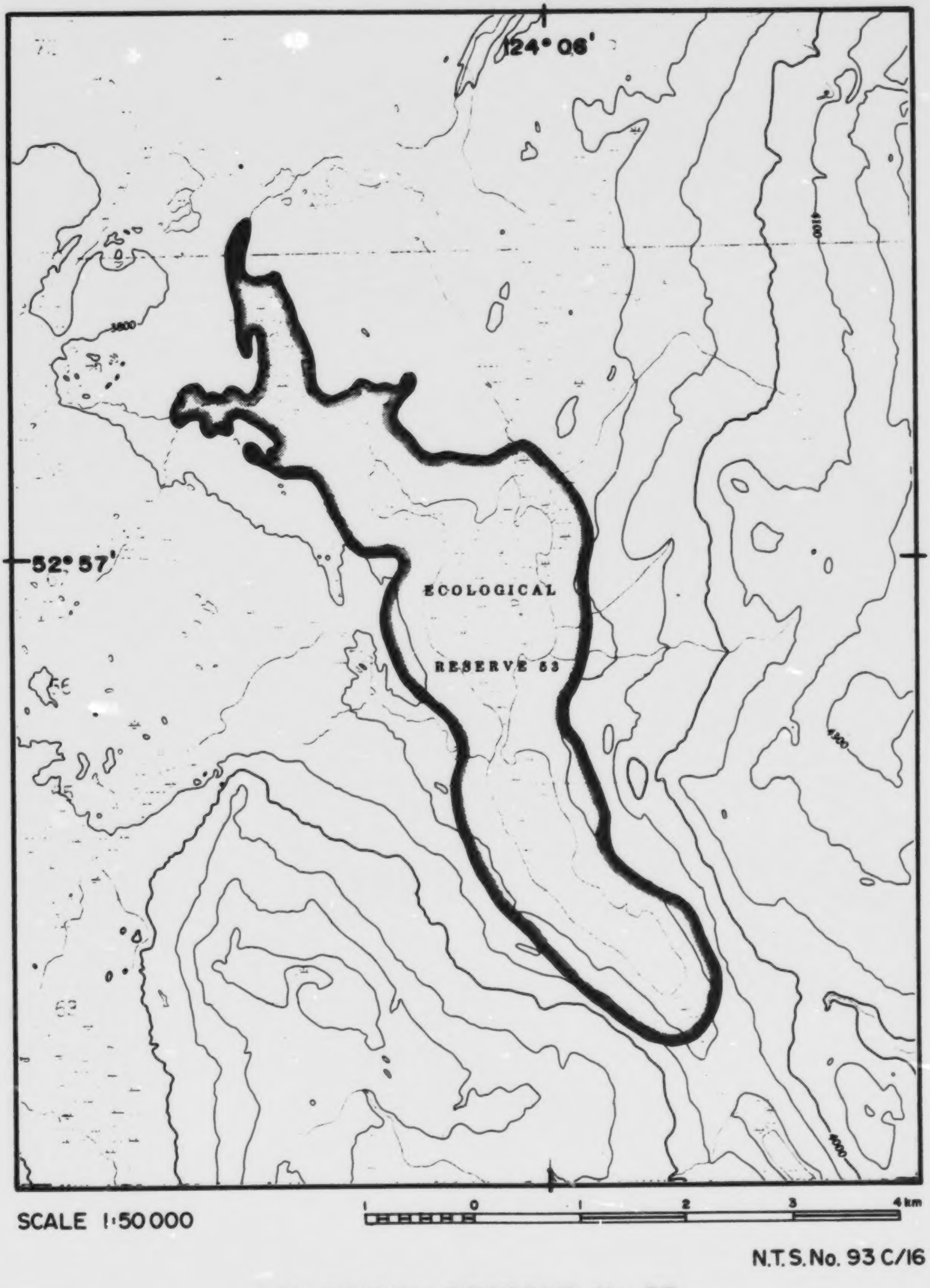
Uplands around much of the lake were burned by a forest fire in 1945 and support dense stands of juvenile lodgepole pine with occasional veteran spruces which escaped burning. Some spruce regeneration is present in the burns. Mature forest is present along the west side of the northern basin and southwest edge of the south basin. This tends to be dominated by lodgepole pine with a lichen understory, or by a mixture of pine and spruce. Both Engelmann and white spruce are thought to be present, and occasional specimens of subalpine fir.

Moose forage on aquatic plants in the lake in summer, and the adjacent wetlands are rated as high capability moose winter range. The lake also has a good capability for waterfowl production and for use by a variety of aquatic birds during migration, however surveys to assess such use have not been carried out. Fish and aquatic invertebrates have not been inventoried.

OUTSTANDING FEATURES: Productive and diverse shallow lake and wetland habitats of high capability for aquatic birds and mammals.

OTHER INFORMATION: Order-in-Council no. 3293, 9 October 1973, and 4149, 13 December 1973 (ammendment). Application no. 80. Map no. 93 C/16. The most ready access is by float-equipped aircraft.

2-53B


124° 08'
52° 57'
ECOLOGICAL
RESERVE 53
3800
4100
4300
4000
SCALE 1:50000
1 0 1 2 3 4 km

N.T.S. No. 93 C/16

ECOLOGICAL RESERVE No. 53
NARCOSLI LAKE

NITINAT LAKE

E.R. #54

PURPOSE: To preserve Douglas fir trees near their westernmost limit of distribution on southern Vancouver Island

LOCATION: E shore of Nitinat Lake, 33 km NW of Port Renfrew, Vancouver Island

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SIZE: 79 ha LAT: 48°46'N LONG: 124°43'W ELEVATION: 0 - 300 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

The reserve extends for about 2.5 km along the Nitinat Lake shoreline and 300 m inland. It has steep slopes varying in exposure from west to northwest. Rocky outcrops, bluffs, and talus are common, especially near lake level. The regional bedrock is primarily granitic; soils are mostly Podzols developed on glacial till and colluvium. Surrounding mountains of the Vancouver Island Ranges rise to about 1000 m. The climate is moderated by low elevation and proximity to the outer coast (12.5 km). Precipitation is in the 250 - 350 cm range.

Nitinat Lake, although not part of the reserve, is of interest because it is slightly tidal, has a thin layer of fresh water on its surface and salt water beneath that, and contains mostly marine or brackish organisms.

BIOTIC FEATURES:

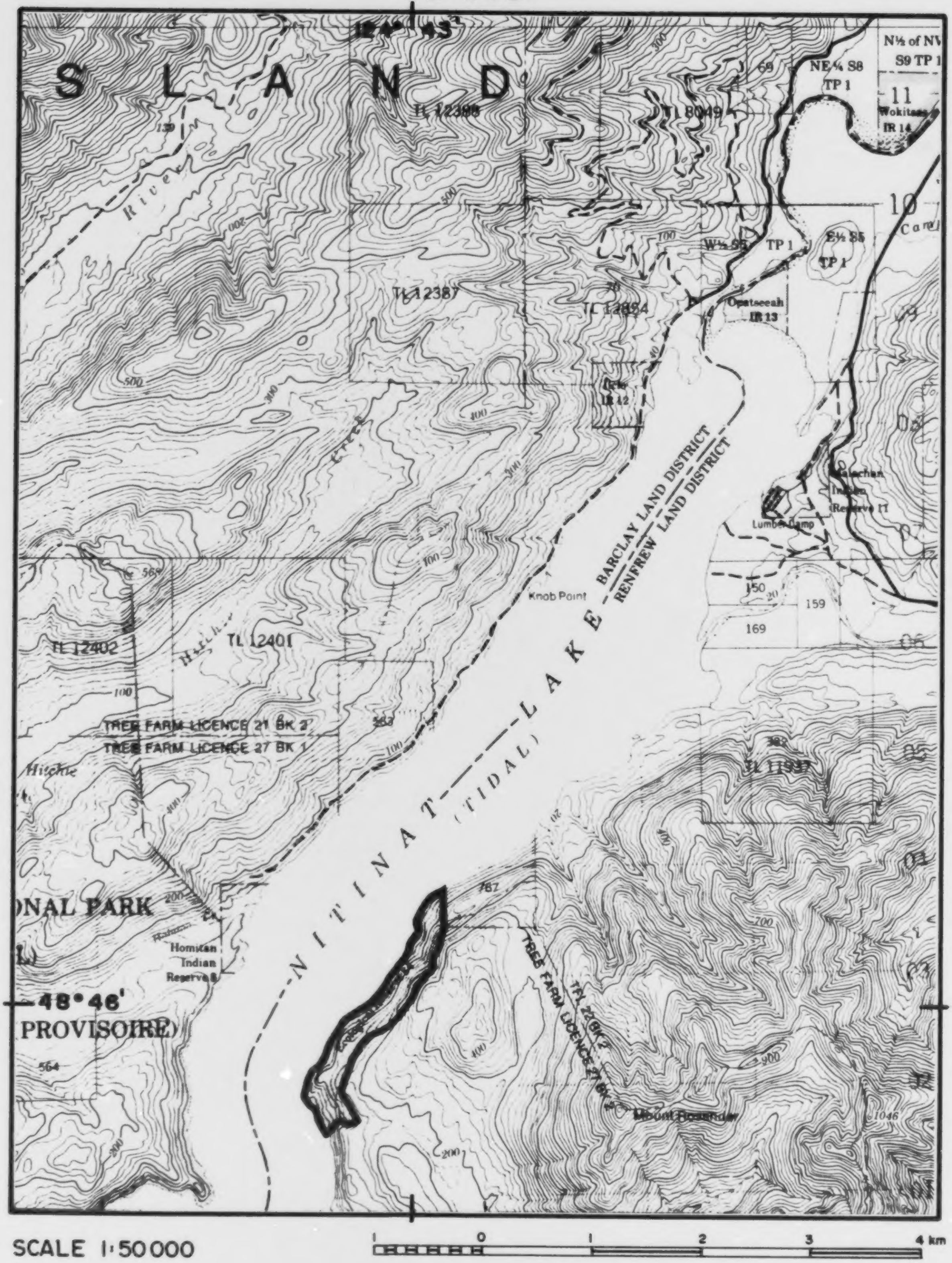
Douglas fir and Sitka spruce trees occur here in scattered stands among broken rock and bluffs, where competition from other coniferous trees is reduced. Characteristic understory plants in areas where the fir is most abundant are the moss Stokesiella oregana and the lichen Cladonia gracilis. Western hemlock is the dominant tree over most of the area on representative sites. Two hemlock communities have been noted, one with an understory of salal, oval-leaved blueberry and red huckleberry, the other characterized by Alaskan blueberry and the moss Rhytidiadelphus loreus. Other trees in the reserve include western redcedar, yellow cedar, amabilis fir, western mountain-ash, and western yew. Some wildflowers noted here are the trillium, false lily-of-the-valley, Siberian miner's lettuce, clasping twistedstalk, and Hooker's fairybells. At least six species of ferns and 22 bryophytes are present. The vertebrate fauna has not been surveyed.

OUTSTANDING FEATURES: Co-occurrence of Douglas fir and Sitka spruce on very steep slopes.

OTHER INFORMATION: Order-in-Council no. 338, 31 January 1974, and 661, 24 February 1977 (ammendment). Application no. 94. Map no. 92 C/15. Access by boat on Nitinat Lake or by logging roads.

Logging is proceeding at and near the reserve boundary. This may have some impact via blow-down or erosion from upslope.

2-54B



124° 43'
S L A N D
TL 12388
TL 8049
N½ of NW
S9 TP 1
NE¼ S8
TP 1
69
11
Wokitsas
IR 14
10
River
W½ S5
TP 1
E½ S5
TP 1
TL 12387
TL 12854
Opatseeah
IR 13
IR 12
BARCLAY LAND DISTRICT
RENFREW LAND DISTRICT
Malachan
Indian
Reserve 11
Lumber Camp
Knob Point
150
159
169
568
TL 12402
TL 12401
TREE FARM LICENCE 21 BK 2
TREE FARM LICENCE 27 BK 1
NITINAT LAKE
(TIDAL)
TL 11937
ONAL PARK
Homitan
Indian
Reserve 8
48° 46'
PROVISOIRE)
564
787
TREE FARM LICENCE 27 BK 1
TFL 21 BK 2
Mount Rosander
1046
1
0
1
2
3
4 km

SCALE 1:50000

N.T.S. No. 92 C/15

ECOLOGICAL RESERVE No. 54
NITINAT LAKE

CARDIFF MOUNTAIN E.R. #55

PURPOSE: To protect a site having outstanding basalt columns

LOCATION: 70 km SW of Hanceville, Chilcotin district

SIZE: 65 ha LAT: 51°29'N LONG: 123°46'W ELEVATION: 1400 - 1560 m

BIOGEOCLIMATIC ZONE: Sub-Boreal Spruce

PHYSICAL FEATURES:

This reserve is mostly noteworthy for its symetrical, vertical columns of basalt, reputed to be the finest examples in the province. These are exposed on the northwest side of Cardiff Mountain, which is situated in the center of the reserve. Though rising only about 50 m above the gently rounded hilltop, the loaf-like profile of this crescent-shaped, flat-topped, volcanic remnant is recognizable from some distance. On the slightly concave western side of the mountain, vertical cliffs rise for about 35 m above talus slopes formed by disintegration of the lava columns. Slopes on the eastern convex side are inclined at about 45°.

The lava columns, packed tightly together in the lower part of a vertical cliff and capped with masses of fractured basalt, are so striking that only a picture could do them justice. Each column consists of 20 or more blocks 30 to 40 cm in depth, each block having five to eight straight sides. Crustose lichens give the columns an orange tinge.

This small but varied reserve also contains several bodies of standing water. A teardrop shaped lake, about 300 m long, occupies the southeast corner of the reserve, while a large permanent pond is perched incongruously on the gently rolling upper surface of the mountain.

BIOTIC FEATURES:

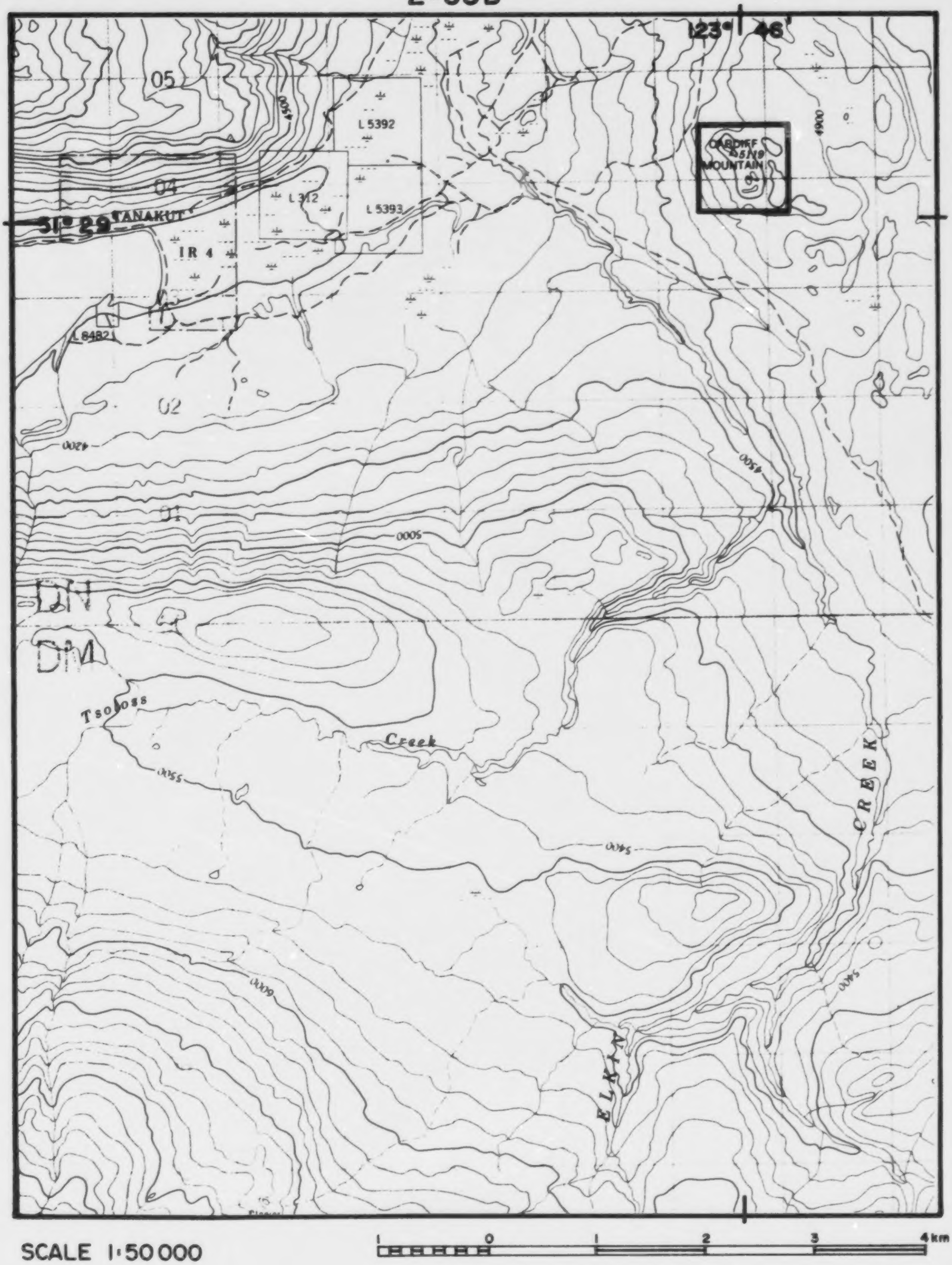
Most of the reserve has been burned fairly recently. Forest cover is dominated by seral trees like lodgepole pine and aspen, although Douglas fir veterans are scattered along the basalt ridges and some Engelmann spruce and the occasional subalpine fir occur in a moist hollow. Dominant understory plants in lodgepole pine burns are pinegrass, kinnikinnick, and rosy pussytoes. Kinnikinnick and pinegrass also characterize the scattered Douglas fir stands, while aspen groves have an understory in which soopolallie, wheatgrasses, needlegrasses, kinnikinnick, and rosy pussytoes are abundant.

OUTSTANDING FEATURES: Exceptional, relatively accessible, basalt columns.

OTHER INFORMATION: Order-in-Council no. 1760, 28 May 1974. Application no. 161. Map no. 92 O/5. Access is via the main road to Konni Lake and a 1.5 km rough track leaving that road about 3.5 km east of Konni Lake.

Cattle grazing occurs here and species such as dandelion are abundant where use has been heavy.

2-55B



123°
46'
51°
29'
05
04
02
01
TANAKUT
IR 4
L 5392
L 312
L 5393
L 8482
4900
4200
5000
4500
5500
5400
6000
CARDIFF
55/19
MOUNTAIN
DN
DM
Tsoloss
Creek
CREEK
ELKIN
1
0
1
2
3
4 km

SCALE 1:50 000

N.T.S. No. 92 O/5

ECOLOGICAL RESERVE No. 55
CARDIFF MOUNTAIN

GOOSEGRASS CREEK

E.R. #56

PURPOSE: To protect an entire drainage basin of wide elevational range containing representative, undisturbed examples of three biogeoclimatic zones in an area of wet interior climate

LOCATION: W side of Kinbasket Lake (Mica Reservoir), 20 km E of Mica Creek

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SIZE: 2,185 ha LAT: 52°00'N LONG: 118°15'W ELEVATION: 790 - 3020 m

BIOGEOCLIMATIC ZONES: Interior Cedar - Hemlock; Engelmann Spruce - Subalpine Fir; Alpine Tundra

PHYSICAL FEATURES:

The reserve is a steep, northerly exposed drainage basin on the west side of the Rocky Mountain Trench. It has been heavily glaciated and alpine glaciers still cover most land above the 2100 m level. Glacial evidence includes moraines, cirque basins with steep headwalls, and the U-shaped valley profile. Rock and talus surfaces dominate the higher elevations and steepest slopes. Forested lands have a thin mantle of coarse-textured soil that tends to be leached by heavy precipitation. Goosegrass Creek and its tributaries are turbulent mountain streams.

BIOTIC FEATURES:

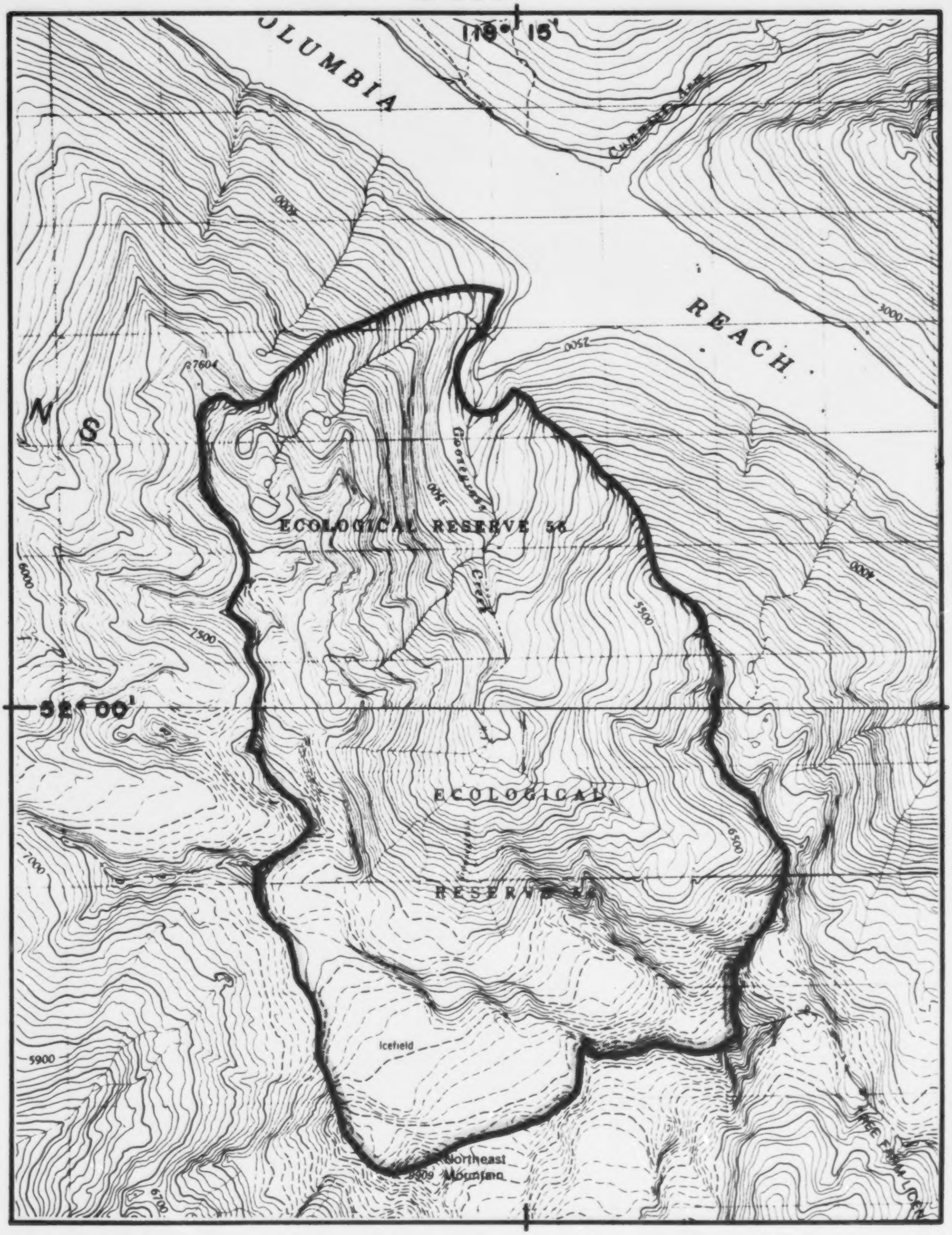
Plant communities exhibit a transition from western redcedar - western hemlock forest at low elevation to Engelmann spruce - subalpine fir cover at higher levels and alpine tundra above treeline. The forests are in a climax state and wildfire influence has been negligible. Many plants here are indicators of high rainfall. Shrubs in the cedar - hemlock forest include devil's club, Douglas maple, Sitka mountain ash, and oval-leafed blueberry. Three kinds of ferns are common in that zone. In the spruce - fir zone, representative shrubs are black huckleberry, false azalea, and white-flowered rhododendron; typical herbs include spiny wood fern and queen's cup. Several herbaceous or shrub communities of limited extent occur in forest openings, on avalanche paths, and in riparian situations within the forest zones. Dominant plants in alpine habitats are red and white mountain-heather, and alpine wintergreen.

The fauna has not been surveyed. Land capability for ungulates is low. The reserve provides good habitat for grizzly and black bears, marten, and a variety of small mammals and birds at home in old-growth forest.

OUTSTANDING FEATURES: This is the only sizeable, undisturbed watershed in the wet interior climatic zone having ecological reserve status. It is ideal for long-term monitoring of climax forest ecology and watershed hydrology.

OTHER INFORMATION: Order-in-Council no. 4040, 23 December 1974. Application no. 99. Map no. 82 M/16; 83 D/1. Accessible only by boat.

2-56B


118° 15'
COLUMBIA
Cummins
REACH
3000
2500
8000
7604
N S
Goosegrass Creek
3500
ECOLOGICAL RESERVE 56
4000
5500
6000
7500
52° 00'
ECOLOGICAL
RESERVE 56
6500
7000
Icefield
5900
Northeast Mountain
9909
6700
TREE FARM LICEN

SCALE 1:50000

1 0 1 2 3 4 km

N.T.S.No.83D/1,
82M/16

ECOLOGICAL RESERVE No. 56
GOOSEGRASS CREEK

CHICKENS NECK MOUNTAIN E.R. #57

PURPOSE: To preserve an excellent stand of mature spruce - subalpine fir forest in the Boreal White and Black Spruce Zone

LOCATION: Adjacent to Highway 37, 53 km N of Dease Lake village

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SIZE: 680 ha LAT: 58°55'N LONG: 129°55'W ELEVATION: 760 - 1512 m

BIOGEOCLIMATIC ZONES: Boreal White and Black Spruce; Spruce - Willow - Birch; Alpine Tundra

PHYSICAL FEATURES:

The reserve is within the Stikine Ranges of northwestern British Columbia. These mountains have a core of granitic rocks which intrude folded sedimentary and volcanic rocks. The reserve is on relatively steep north-facing slopes in the Dease River valley and contains rounded summits that are outliers of Chickens Neck Mountain. Mountains in this area are too low to have been sculpted by alpine glaciers and slopes within the reserve have been little dissected by stream erosion, therefore the land surface, though strongly sloping, is fairly smooth. Climate at middle elevations should be similar to Cassiar (1075 m elevation), where mean daily January and July temperatures are -18°C and 11°C respectively and mean annual precipitation is 28 cm, 58% of which falls as snow.

BIOTIC FEATURES:

Four spruce-dominated forest communities have been identified in the Boreal White and Black Spruce Zone, on slopes below the 1100 - 1200 m elevation. Both white and black spruce and their hybrids are present. Subalpine fir is co-dominant or sub-dominant in two of those communities, one of which is characterized by bunchberry and mosses in the understory, the other by wood horsetail. Other spruce types have understories in which pale comandra and single delight are common, or an understory dominated by shrubs such as alder, gooseberry, and highbush-cranberry.

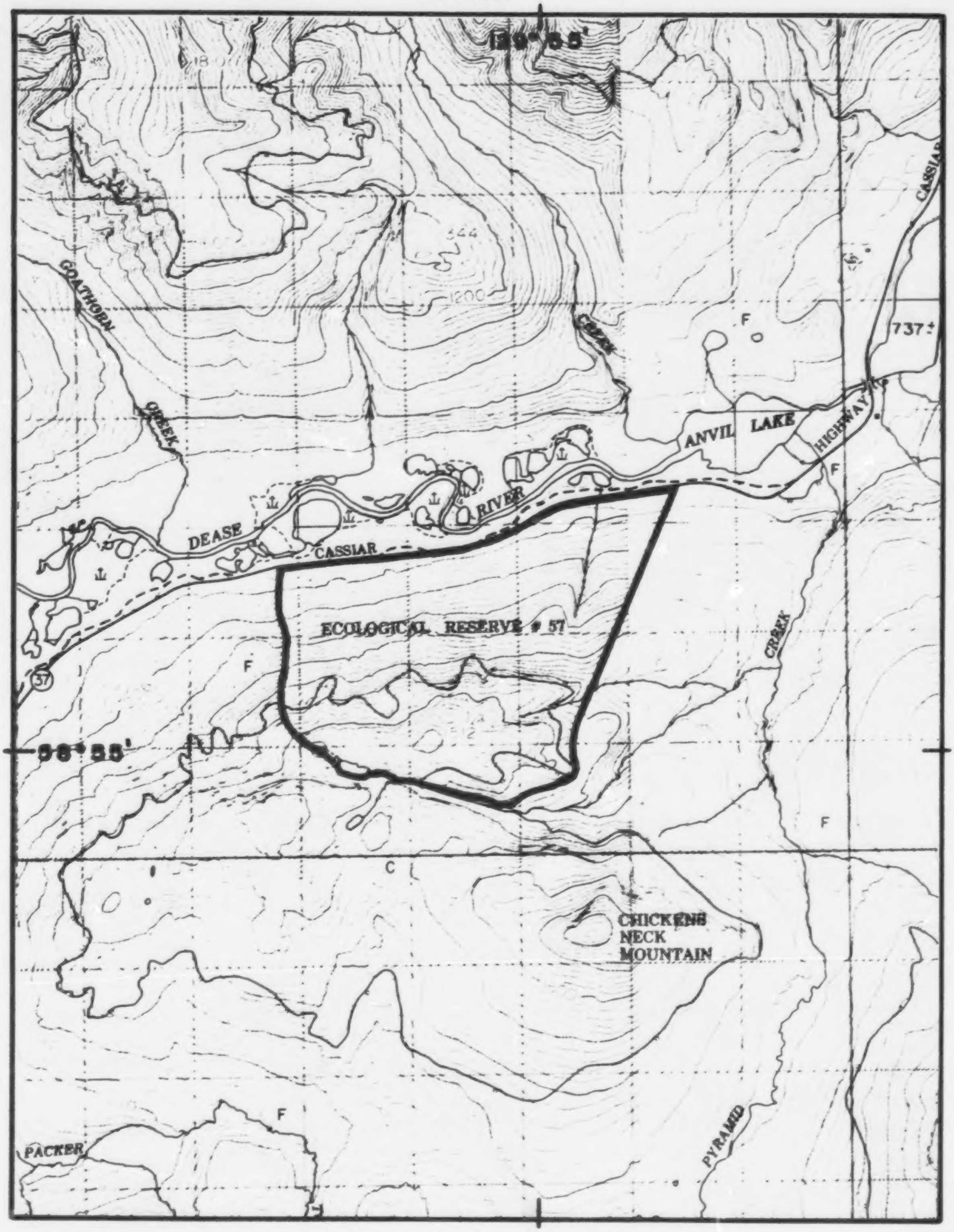
Above the 1100 - 1200 m level, communities of the Spruce - Willow - Birch Zone are developed. Due to slope steepness they occupy a fairly narrow elevational zone. Small areas of alpine vegetation occur on rounded summits in the southern part of the reserve, above about the 1420 m level. The vegetation of these upper elevation zones has not been investigated in the field.

The fauna has not been surveyed. Birds noted here include the raven, American kestrel, and merlin. Upper elevation habitats appear to be excellent for grizzly bears, caribou, wolverine, and ptarmigan.

OTHER INFORMATION: Order-in-Council no. 440, 6 February 1975. Application no. 138. Map no. 104 I/13. Access via the Stewart - Cassiar Highway which marks the northern boundary of the reserve.

This is one of few unburned and accessible stands of spruce forest in this area.

2-57B



129°55'
58°55'
544
1200
GOATHORN
CREEK
CREEK
CASSIAR
737±
ANVIL LAKE
HIGHWAY
DEASE RIVER
CASSIAR
ECOLOGICAL RESERVE # 57
37
CREEK
CHICKENS NECK MOUNTAIN
PYRAMID
PACKER
F
C

SCALE 1:50000

1 0 1 2 3 4 km

N.T.S. No. 104 I/13

ECOLOGICAL RESERVE No. 57
CHICKENS NECK MOUNTAIN

BLUE/DEASE RIVERS

E.R. #58

PURPOSE: Establishment of a research area containing a variety of communities in the Boreal White and Black Spruce Zone

LOCATION: 32 km W of Lower Post; 2.5 km W of Highway 37

SIZE: 777 ha LAT: 59°52'N LONG: 129°14'W ELEVATION: 855 - 975 m

BIOGEOCLIMATIC ZONE: Boreal White and Black Spruce

PHYSICAL FEATURES:

The reserve lies on a plain of low relief in the Liard River drainage. Micro-relief is provided by many glacial features, oriented in an east-west direction, including eskers, drumlins and morainal landforms. These show prominently on air photos. The present surface is largely the product of glacial processes, and post-glacial erosion is seen only in a few meters of down-cutting by small streams. Two lakes and several wetlands are present.

BIOTIC FEATURES:

Despite having little elevational relief, the reserve displays a variety of habitats. This is attributable to various slope exposures on landforms such as eskers, an array of moisture conditions from lakeshores to gravelly drumlins, and the historical occurrence of wildfire.

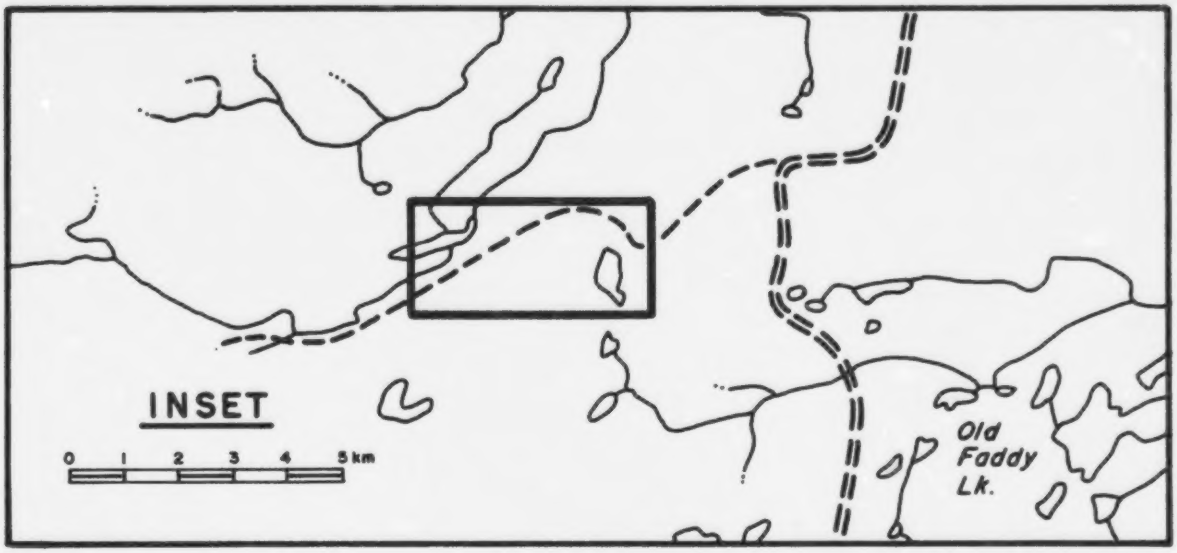
Treeless wetlands include sedge-dominated marshes and fens, as well as seepage areas dominated by northern golden-saxifrage, far-northern buttercup, and aquatic mosses. Two tamarack - scrub birch - willow types are present, one in fen situations associated with water sedge, the other in less saturated environments having ground cover of red bearberry and moss. Black spruce bog forest, characterized by Labrador tea, cloudberry, red bearberry, and moss, is also present.

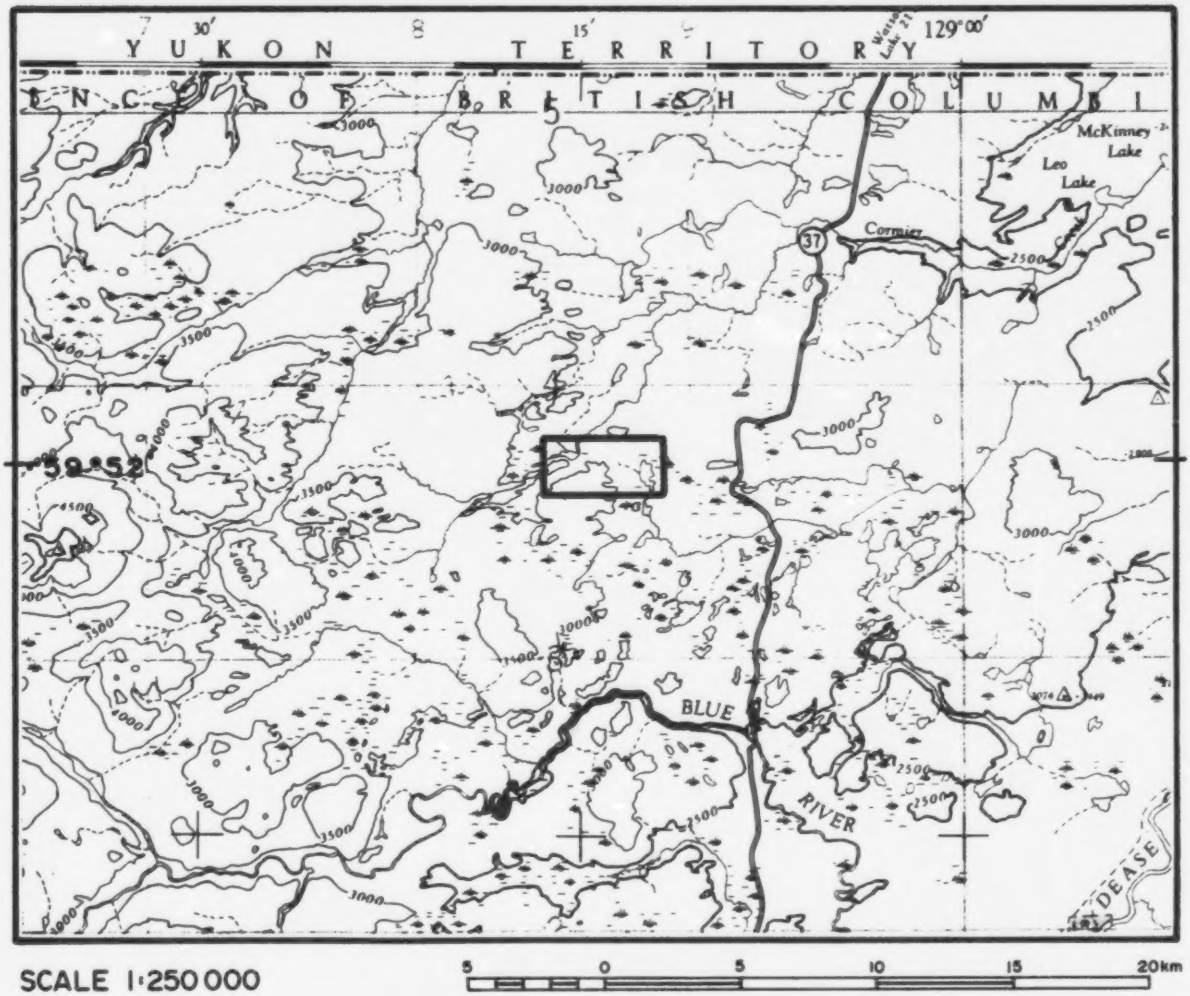
Upland forest communities occur in a complex mosaic. Typical white spruce stands have ground cover dominated by lingonberry and feather moss while wetter sites have those species plus some black spruce, scrub birch, and Labrador tea. Lodgepole pine woods occur on well-drained eskers and drumlins. In the driest sites the typical association is one of pine, Bebb's willow, arctic lupine, and Altai fescue; in other sites the pine is mixed with white spruce and understory representatives are arctic lupine, and mosses.

Mammals or their sign noted here include moose, wolf, black bear, marten, snowshoe hare, and red squirrel. Willows have been heavily browsed by moose. Among birds, spruce grouse, gray jay, three-toed woodpecker, yellow-rumped warbler, dark-eyed junco, and pine siskin have been recorded.

OTHER INFORMATION: Order-in-Council no. 441, 6 February, 1975. Application no. 145. Map no. 104 P (1:250,000). Access via dirt road west from Highway 37 about 12.5 km south of Yukon border.

2-58B


INSET
0 1 2 3 4 5 km
Old Faddy Lk.


30'
15'
129°00'
YUKON TERRITORY
Watson Lake 21
PROVINCE OF BRITISH COLUMBIA
McKinney Lake
Leo Lake
Cormier
37
3000
3500
2500
4500
59°52'
BLUE RIVER
DEASE
5 0 5 10 15 20km

SCALE 1:250 000

N.T.S. No. 104 P

ECOLOGICAL RESERVE No. 58
BLUE/DEASE RIVERS

NINGUNSAW RIVER E.R. #59

PURPOSE: Preservation of an elevational sequence of three biogeoclimatic zones in a transition between coastal and interior climates

LOCATION: 105 km N of Stewart, beside Highway 37

SIZE: 2,046 ha LAT: 56°54'N LONG: 130°07'W ELEVATION: 460 - 1730 m

BIOGEOCLIMATIC ZONES: Coastal Western Hemlock; Engelmann Spruce - Subalpine Fir; Alpine Tundra

PHYSICAL FEATURES:

The reserve encloses a rounded mountain on the interior flank of the Coast Mountains. This mountain, in contrast to higher peaks south and west of it, was over-ridden by Pleistocene ice, and is too low to have developed alpine glaciers during the post-glacial period. All slope exposures except southwest are represented. An unnamed creek in the southern part of the reserve has eroded a deep, steep-sided valley into the sedimentary bedrock. Most of the reserve is gently to strongly sloping but small alluvial flats occur along the Ningunsaw River which flows in an arc around the north side of the reserve, marking the reserve boundary for half of its perimeter.

BIOTIC FEATURES:

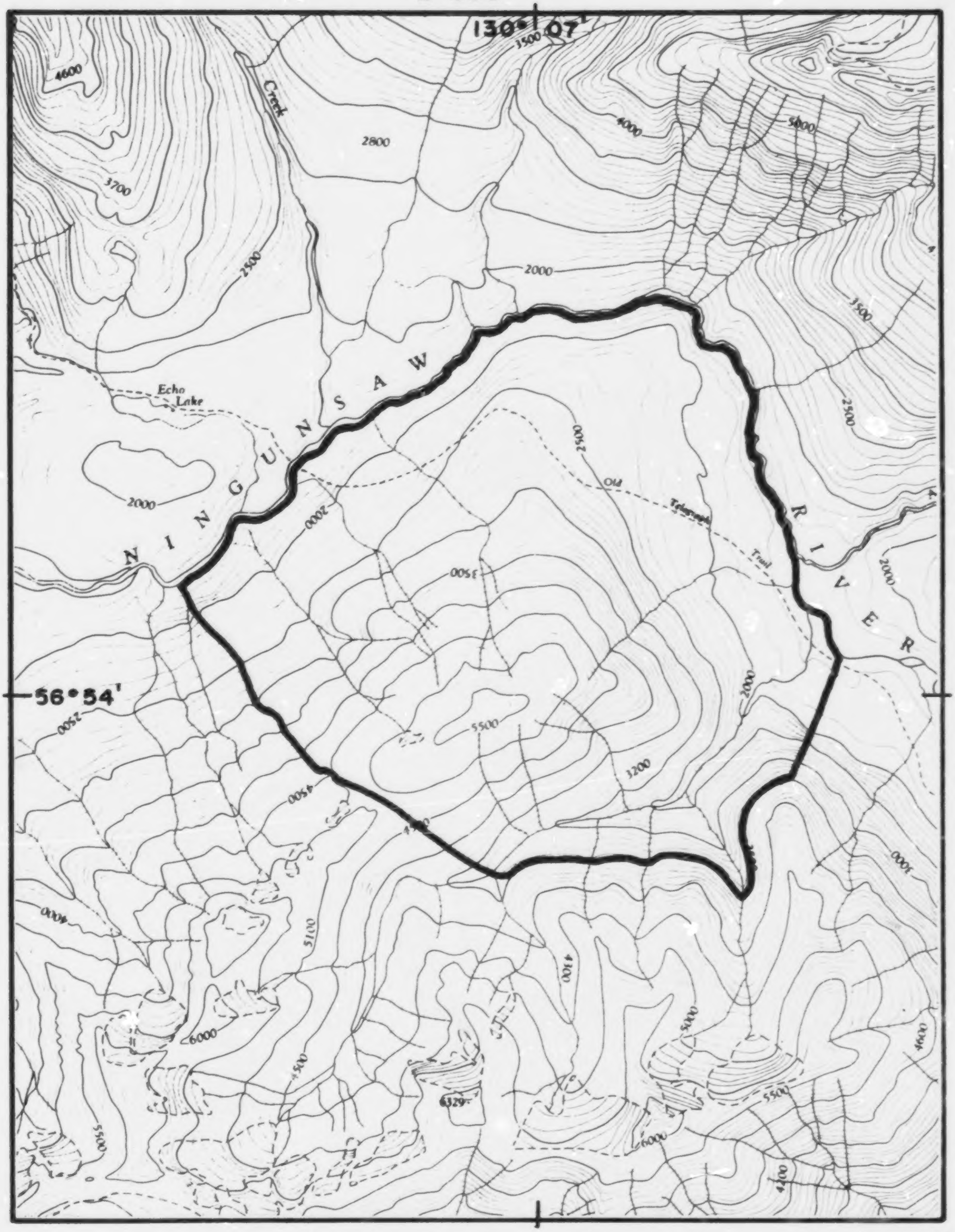
Wide elevation range, a variety of slope exposures, and frequent snow avalanches, result in considerable habitat diversity. Climatic conditions transitional between the wet coast and dry interior promote a diversity of plant species but create problems for zonal classification. This reserve is near the southern limit of the Boreal White and Black Spruce and Spruce - Willow - Birch Zones, the northeastern edge of the Coastal Western Hemlock and Mountain Hemlock Zones, and northwestern extremity of the Engelmann Spruce - Subalpine Fir Zone.

Alluvial lands along the Ningunsaw River are dominated by black cottonwood - alder - willow stands or mixed spruce - cottonwood forest. Western hemlock woods, mixed with either white spruce or lodgepole pine, occur on the lower slopes, and alder-dominated slide paths form ribbons through the forest at middle elevations. Typical subalpine forests are dominated by subalpine fir, Engelmann spruce, Sitka alder, willows, one-leaved foamflower, and rosy twistedstalk. Barclay's and tea-leaved willows, scrub birch, sweet colts'-foot, and junipers are common near timberline. Alpine communities have not been described

The reserve provides excellent year-round habitat for grizzly bears and good summer through fall range for moose.

OTHER INFORMATION: Order-in-Council no. 442, 6 February 1975. Application no. 124. Map no. 104 B/16. Access via Highway 37, but the Ningunsaw River must be crossed to get into the reserve.

2-59B



130° 07'
56° 54'
NINGUNSAW RIVER
Creek
Echo Lake
Old Telegraph Trail
4600
3700
2800
2500
2000
3500
4000
5000
5500
3200
4500
5100
6000
4300
6329

SCALE 1:50000

1 0 1 2 3 4 km

N.T.S. No. 104 B/16

ECOLOGICAL RESERVE No. 59
NINGUNSAW RIVER

DRYWILLIAM LAKE E.R. #60

PURPOSE: To preserve for forestry research a representative stand of Douglas fir in the Sub-boreal Spruce Zone

LOCATION: Adjacent to Highway 16, 45 km W of Vanderhoof

SIZE: 95 ha LAT: 54°04'N LONG: 124°42'W ELEVATION: 730 - 800 m

BIOGEOCLIMATIC ZONE: Sub-boreal Spruce

PHYSICAL FEATURES:

The reserve straddles a low southwest - northeast trending ridge between Drywilliam and Fraser Lakes on the Nechako Plateau. Though relief is not pronounced, the southern part of the reserve has a southeast aspect while the northern portion slopes gently to the northwest. Soils are well drained and there are no streams or water bodies within the reserve.

BIOTIC FEATURES:

Factors such as relatively low elevation, southern exposure, and well-drained gravelly soils result in the occurrence, in the southern part of the reserve, of Douglas fir trees and associated plants like redstem ceanothus and needlegrasses. These plants are common in southern British Columbia but in the Sub-boreal Spruce Zone they occur only as isolated populations. The well-spaced veteran Douglas fir trees, though not tall by coastal standards, are large and very old. There is some Douglas fir regeneration. White spruce is extensive in the northern part of the reserve.

The Douglas fir stands have an understory characterized by either common snowberry or by prickly rose and kinnikinnick. Groves of aspen with shrubs like willow and Saskatoon, and small openings dominated by needlegrasses and blue wildrye are also present. Other plant communities are believed to be present but not yet described.

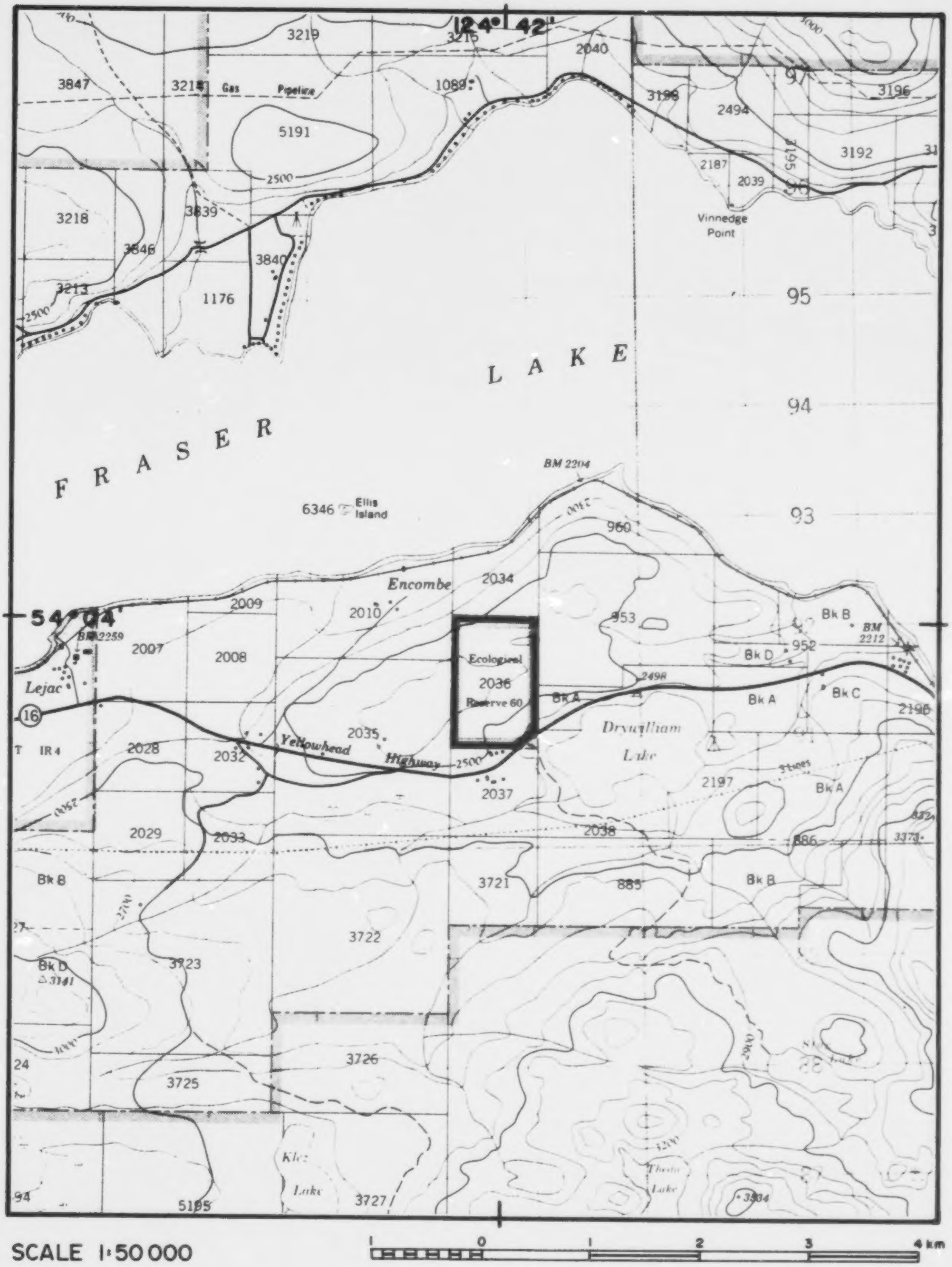
The fauna has not been systematically surveyed, but snowshoe hares coyotes, and black bears have been seen, as well as moose and deer droppings. Ruffed grouse, great horned owls, bald eagles, and red-tailed hawks have been noted at the reserve. The reserve and adjacent lands provide high-capability winter range for mule deer and moose.

OUTSTANDING FEATURES: Douglas firs and associated vegetation reminiscent of the Interior Douglas Fir Zone in a Sub-boreal location.

OTHER INFORMATION: Order-in-Council no. 1520, 1 May 1975. Application no. 158. Map no. 93 K/2. Access directly from Highway 16.

A gravel pit in the middle of the reserve has been blocked off to allow natural revegetation. Vegetation has been affected by fire and probably by highway construction. The north half of the reserve was extensively logged about 1912. Crown lands adjacent to the reserve have been designated for wildlife habitat preservation.

2-60B


124° 42'
54° 04'
FRASER LAKE
Ellis Island
6346
Encombe
Lejac
Ecological 2036 Reserve 60
Drywilliam Lake
Yellowhead Highway
16
Vinnedge Point
Gas Pipeline
BM 2204
BM 2259
BM 2212
Bk A
Bk B
Bk C
Bk D
IR 4
Klez Lake
Thesta Lake
95
94
93
3219
3215
2040
3847
3218
1089
5191
3198
2494
3196
3192
2187
2039
3218
3839
3846
3840
3213
1176
2034
2009
2010
953
952
2007
2008
2498
2198
2035
2028
2032
2037
2197
2029
2033
2038
886
3721
885
3722
3723
3141
3726
3725
3727
5195
3384
0
1
2
3
4 km

SCALE 1:50 000

N.T.S. No. 93 K/2

ECOLOGICAL RESERVE No. 60
DRYWILLIAM LAKE

UPPER SHUSWAP RIVER E.R. #61

PURPOSE: Retention of old-growth western redcedar stands of exceptional growth in an area of wet interior climate

LOCATION: Upper Shuswap River valley, 50 km NNE of Cherryville

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SIZE: 70 ha LAT: 50°40'N LONG: 118°21'W ELEVATION: 745 - 825 m

BIOGEOCLIMATIC ZONE: Interior Cedar - Hemlock

PHYSICAL FEATURES:

This linear reserve lies on the flat but narrow valley bottom of the Upper Shuswap River, which flows from north to south through it. Moderately steep mountain slopes of the Monashee Range rise to about 2285 m on the west and 2885 m on the east. The floor of the Shuswap River valley has a gradient of only 6 m per km in this area. Most of the reserve is flat but fringes of it encompass low terraces and the toes of alluvial fans which are slightly elevated above the floodplain. Surficial deposits are of alluvial origin; soils are believed to be mostly Regosols and Podzols.

BIOTIC FEATURES:

The feature of major interest is the old-growth western redcedar western hemlock forest which covers almost all of the reserve and includes many cedar specimens over 2 m in diameter. Cedar attains its best growth in the Interior Cedar - Hemlock Zone on rich, moist, alluvial sites such as this. The typical forest community is the hemlock - redcedar - oval-leaved blueberry - oak fern - trailing raspberry - moss type. Wetter sites in gullies support a cedar - hemlock - devil's club association. Mosses are abundant throughout the area. Western hemlock is not uncommon throughout the cedar forest; occasional specimens of Engelmann spruce, Douglas fir, western white pine, and western yew occur. Thirteen plant communities have been described.

Shrubby species noted here are Douglas maple, mountain alder, red-osier dogwood, black and red twinberry, baldhip rose, thimbleberry, western mountain-ash, common snowberry, black huckleberry and oval-leaved blueberry. Ferns are well represented, including lady fern, spiny wood fern, Braun's holly-fern, and bracken. Moisture and shade loving members of the lily family such as queen's cup, star-flowered false Solomon's-seal, clasping twistedstalk, rosy twistedstalk, and Indian Hellebore are common.

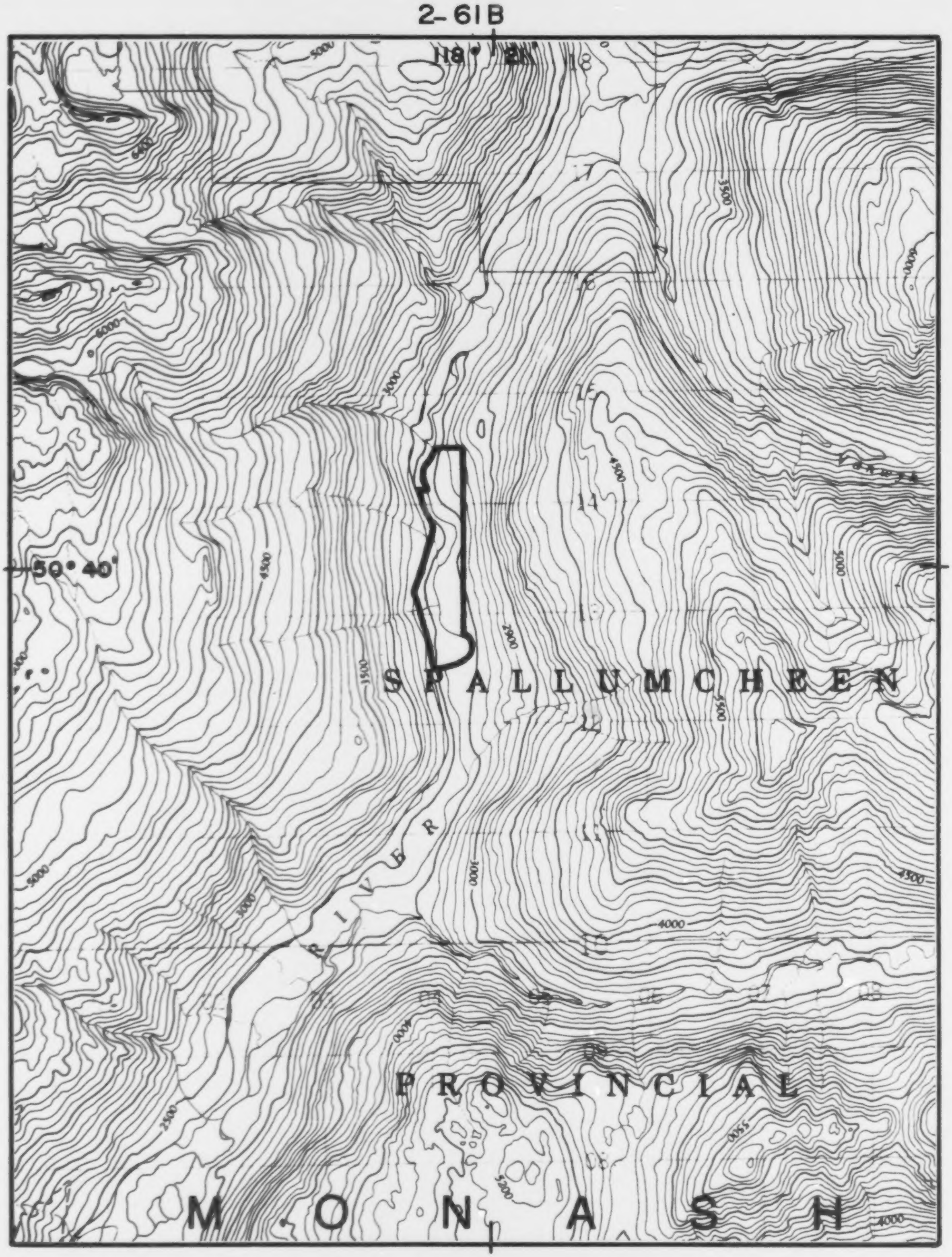
OUTSTANDING FEATURES: The reserve contains a fine stand of old-growth western redcedar on a rich alluvial site.

OTHER INFORMATION: Order-in-Council no. 1607, 1 May 1975. Application no. 87. Map no. 82 L/9. Access via logging road north from Sugar Lake.

Logging is occurring in the area, has reached the reserve boundary on one location, and will increasingly isolate these cedar stands.

A comprehensive natural history report is available.

2-61B


118° 21'
50° 40'
SPALLUMCHEEN
PROVINCIAL
MONASH
RIVER
5000
6400
6000
3000
4500
1500
2000
3500
4000
2500
5200
5500

SCALE 1:50000

N.T.S. No. 82 L/9

ECOLOGICAL RESERVE No. 61
UPPER SHUSWAP RIVER

FORT NELSON RIVER

E.R. #62

PURPOSE: To protect a productive floodplain in the Fort Nelson Lowland

LOCATION: W bank of Fort Nelson River, 20 km NE of Fort Nelson

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SIZE: 121 ha LAT: 58°57'N LONG: 122°31'W ELEVATION: 290 - 295 m

BIOGEOCLIMATIC ZONE: Boreal White and Black Spruce

PHYSICAL FEATURES:

The reserve is situated at the north (downstream) end of an elongated section of floodplain/low terrace land on the west side of the Fort Nelson River. The silt charged river, about 200 m wide and flowing slowly in a single channel, has cut a trench 50 to 100 m below the level of the adjacent plain. The shoreline of the northern half of the reserve is on an inside bend of the river and subject to sediment deposition, especially during the spring flood in June. This process has been going on for many years with the result that much of the reserve displays forest growth in a series of concentric bands which increase in age up-valley and away from the river.

BIOTIC FEATURES:

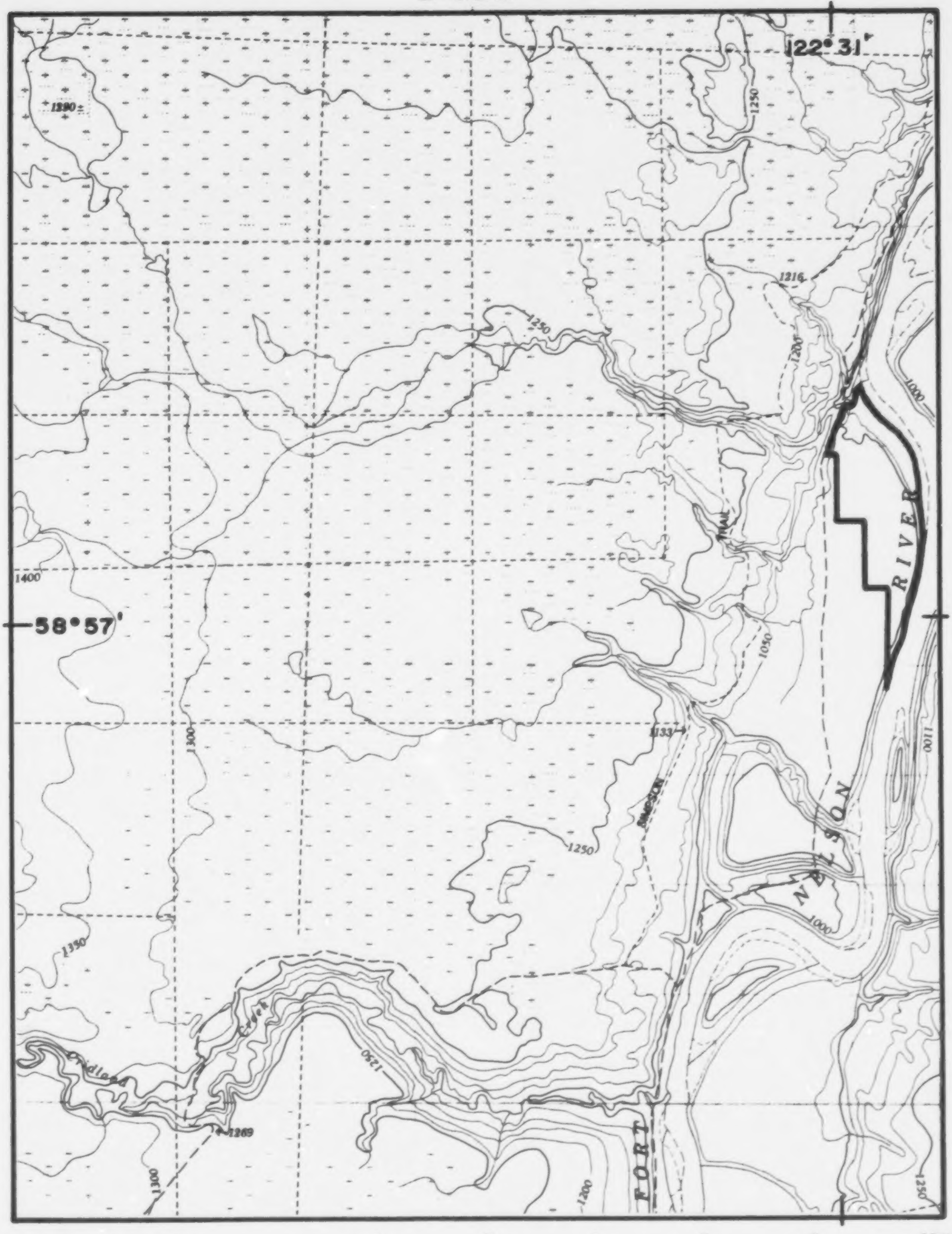
The majority of the reserve contains balsam poplar (cottonwood) forest. The older, slightly higher elevation floodplain land immediately south of the reserve formerly supported white spruce stands of superior growth, but these have now been logged. A few mature white spruce trees occur in the southern extremity of the reserve. Juvenile spruce are becoming established in and will eventually replace the older balsam poplar forest.

The most recent bars along the downstream edge of the reserve have a shrub community dominated by sandbar willow, mountain alder, and scouring-rush. These sites catch considerable silt during the spring flood, and may also be scoured by moving ice during break-up. Inland and upstream from the shrub fringe are juvenile balsam poplar stands, followed by poplar woods of increasing age. The latter have been described as a balsam poplar - white spruce - paper birch - red osier dogwood - common horsetail association.

The fauna has not been surveyed but typical wildlife species in these habitats include moose, beaver, and ruffed grouse. Floodplain sites like this have high primary production due in part to the continual destruction of older soil-vegetation complexes and redistribution of their nutrients.

OUTSTANDING FEATURES: This is an ideal site to monitor channel meander and to study rates of succession on new alluvial deposits.

OTHER INFORMATION: Order-in-Council no. 1608, 1 May 1975. Application no. 42. Map no. 94 J/15. Access by boat along Fort Nelson River, 15 km downstream from Fort Nelson Airport.


122°31'
58°57'
1290±
1250
1216
1200
1000
1400
1050
1133
1100
1300
1250
1350
1269
1200
1250
TRAIL
SIMPSON
Gridland
Creek
FORT
NELSON
RIVER

SCALE 1:50000

1 0 1 2 3 4 km

N.T.S. No. 94 J/15

ECOLOGICAL RESERVE No. 62
FORT NELSON RIVER

SKEENA RIVER

E.R. #63

PURPOSE: To set aside unlogged floodplain islands for research on succession in black cottonwood communities

LOCATION: 50 km W of Terrace

SIZE: 91 ha LAT: 54°19'N LONG: 129°18'W ELEVATION: 15 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

The reserve comprises three large and four small islands in a low-gradient reach of the Skeena River where reduced river velocities allow sediments from upstream to settle out, forming many bars and islands. The river is slightly sinuous here, with a width of 0.7 to 1.7 km. Peak flow in the sediment-laden Skeena results from snowmelt, occurs between May 19 and June 29, and may reach 9,000 m^3/s. The low flow in March may be 50 to 100 times less than peak flow. These flow variations result in considerable channel shifting, and both erosion and accretion of islands. The islands are low and flat, have a high water table, and may occasionally be flooded. A variety of sand and gravel bars is present, including point bars, channel side bars, and mid channel bars.

BIOTIC FEATURES:

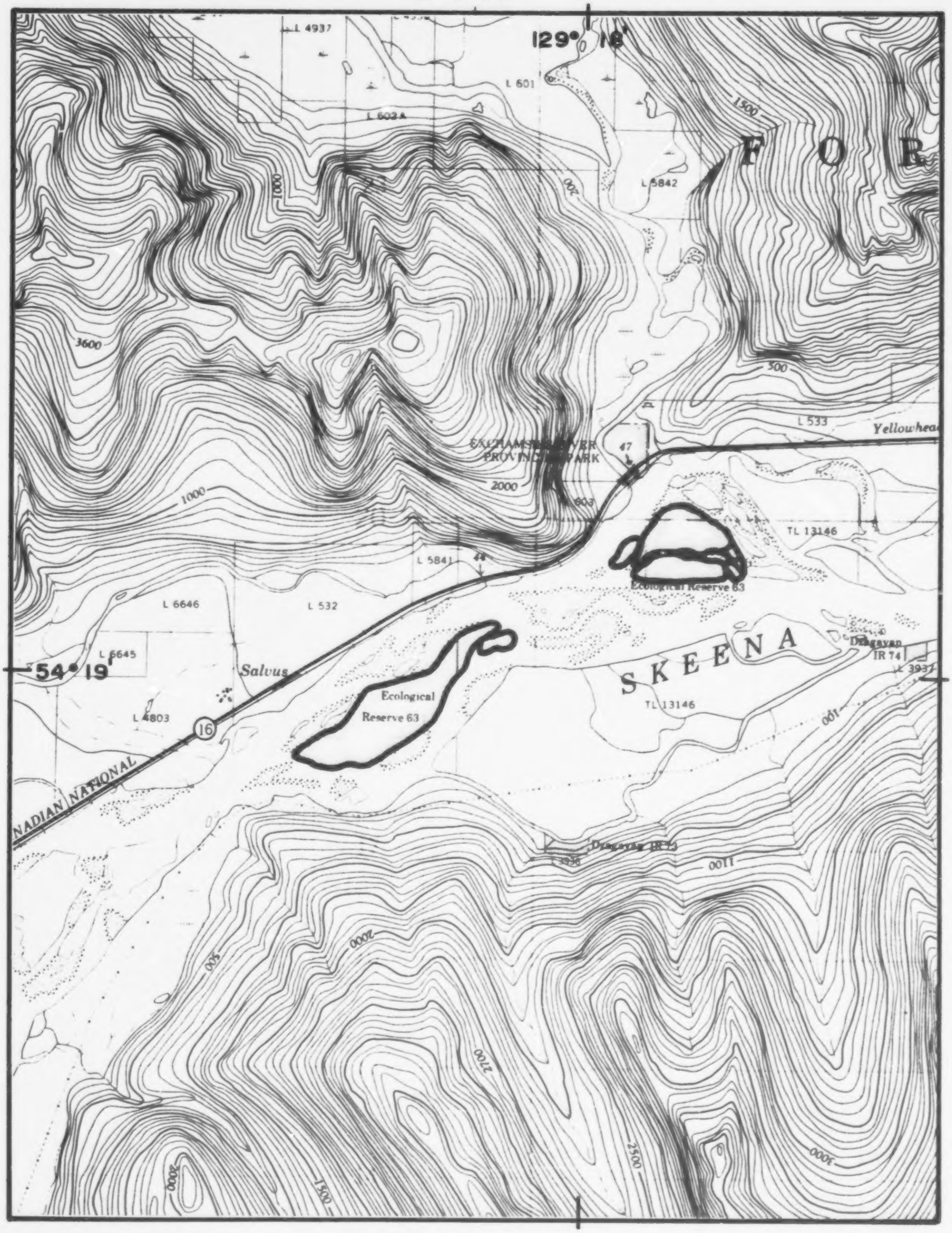
Alluvial processes result in a series of vegetation bands around the island perimeters. The outermost band, subject to considerable flooding and scouring, is dominated by horsetails (northern scouring-rush and common horsetail) in association with willows (Sitka and Pacific willows). Between this zone and the more extensive black cottonwood forest is a narrow band of red alder having an understory dominated by red-osier dogwood and horsetails. Most of the island surfaces support stands of black cottonwood in which red elderberry, salmonberry, and horsetails are abundant.

Birds such as Townsend's and orange-crowned warblers, thrushes, Steller's jays, and ruffed grouse occur in the cottonwood forest; killdeers and spotted sandpipers around the shorelines. Bald eagles are common in the area. The islands have moderate capability for moose production and are believed to be important calving sites for moose. Beaver and raccoons also occur.

OUTSTANDING FEATURES: The reserve is an ideal site to study natural regeneration of black cottonwood, natural succession on unlogged floodplain islands, and relationships between alluvial processes and floodplain vegetation along a large, unregulated river.

OTHER INFORMATION: Order-in-Council no. 2008, 12 June 1975. Application no. 147. Map no. 103 I/6. Access by boat from Exchamsiks River Campground.

2-63B


129° 18'
54° 19'
L 4937
L 601
L 603A
L 5842
F O R
1500
1000
700
3600
500
L 533
Yellowhead
EXCHAMSIKS RIVER PROVINCIAL PARK
47
2000
1000
L 603
L 5841
44
TL 13146
Ecological Reserve 63
L 6646
L 532
L 6645
Salvus
SKEENA
Dragavan IR 74
L 3937
Ecological Reserve 63
TL 13146
L 4803
16
CANADIAN NATIONAL
100
Dragavan IR 73
1100
500
2000
2700
2500
3000
2000
1500

SCALE 1:50 000

1 0 1 2 3 4 km

N.T.S. No. 103 I/6

ECOLOGICAL RESERVE No. 63
SKEENA RIVER

ILGACHUZ RANGE E.R. #64

PURPOSE: Preservation of extensive and diverse alpine - subalpine ecosystems in an isolated massif of volcanic origin

LOCATION: 35 km N of Anahim Lake, Chilcotin district

SIZE: 2,914 ha LAT: 52°47'N LONG: 125°17'W ELEVATION: 1630 - 2408 m

BIOGEOCLIMATIC ZONES: Engelmann Spruce - Subalpine Fir; Alpine Tundra

PHYSICAL FEATURES:

The Ilgachuz Range is one of three distinct mountain masses which lie within the confines of the Fraser Plateau in the Anahim Lake area. All were formed by shield volcanoes of Miocene age which built up dome-like piles of lava and fragmented rock. Volcanic peaks, rugged scarps, and extensive talus slopes characterize the southwestern half of the reserve, while gently sloping lava flows underlie much of its northeastern area. Although these mountains have been dissected by stream erosion and moulded by glaciers, their original shape has been largely preserved. Alpine features such as patterned ground, boulder stripes and solifluction lobes are present.

BIOTIC FEATURES:

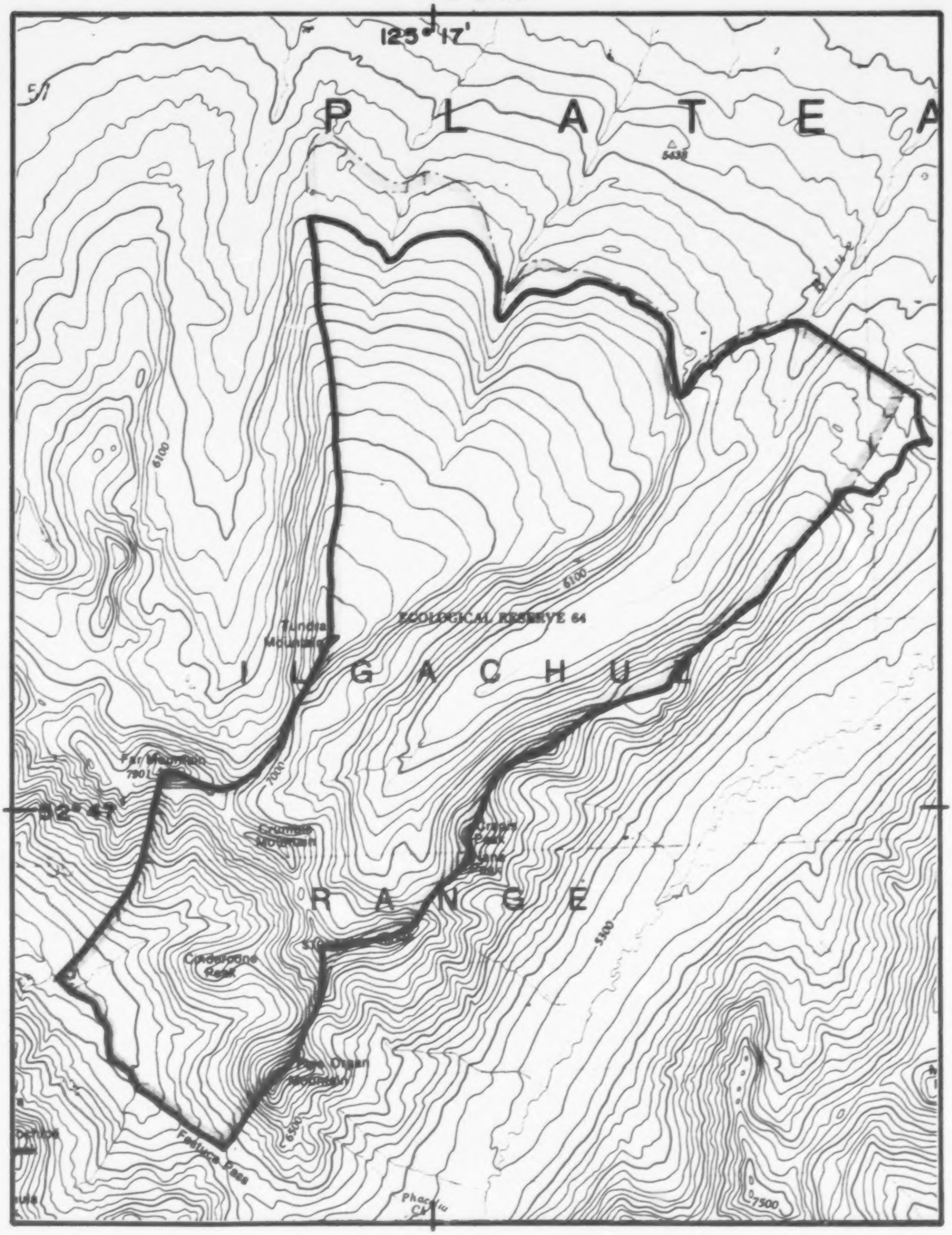
About two thirds of the reserve is in the alpine zone, which consists of both vegetated areas and bare rock. Forested land, dominated by subalpine fir, is largely restricted to the lower valley slopes. A great variety of herbaceous communities is present in this topographically diverse area. Well-drained alluvial sites at low elevation support Altai fescue - mountain avens, or willow - fescue associations. In wet areas along Blue Canyon Creek one finds cotton-grass - sedge bog, sedge - bluejoint meadow, and scrub birch - sedge shrubland. Seepage slopes and wet meadows near timberline have lush wildflower communities dominated by arrowleaved groundsel and containing red paintbrush, Indian hellebore, subalpine daisy, and Sitka valerian. Black alpine sedge stands occur in late snowmelt sites. At timberline a community dominated by Altai fescue and mountain sage occurs on fairly level, dry sites, while white and pink mountain-heather occupy slopes between patches of stunted alpine fir. The most extensive alpine community, common on the rather arid gentle northeast slope of Tundra Mountain, is dominated by Altai fescue, white mountain-avens, netted willow and lichens.

The fauna has not been surveyed, but the Ilgachuz Range has high capability habitat for caribou, moose, and mountain goats.

OUTSTANDING FEATURES: Volcanic landforms and extensive, diverse alpine communities are present. An area of biogeographic interest since many plants and some animals reach their northernmost or southernmost limits here.

OTHER INFORMATION: Order-in-Council no. 2009, 12 June 1975. Application no. 101. Map no. 93 C/14. Access by foot, horseback or helicopter.

2-64B


125° 17'
PLATEA
5438
Blue
6100
ECOLOGICAL RESERVE 64
Tundra Mountain
ILGACHUZ
Far Mountain
7901
7000
52° 47'
RANGE
5300
Cindercone Peak
6500
Festuca Pass
7500

SCALE 1:50000

1 0 1 2 3 4 km

N.T.S. No. 93 C/14

ECOLOGICAL RESERVE No. 64
ILGACHUZ RANGE

CHASM E.R. #65

PURPOSE: Protection of a northern stand of ponderosa pine for research

LOCATION: Beside Highway, 97, 17 km NNE of Clinton

SIZE: 197 ha LAT: 51°14'N LONG: 121°30'W ELEVATION: 1075 - 1105 m

BIOGEOCLIMATIC ZONE: Interior Douglas Fir

PHYSICAL FEATURES:

The reserve lies at the southern edge of the Fraser Plateau. The region is underlain by flat or gently dipping basaltic flows, characterized by steep escarpments along rivers and creeks (e.g. Chasm Creek) and almost horizontal upper surfaces. The reserve is entirely on one of these flat surfaces, capped with glacial drift. Minor relief features include drumlin-like ridges caused by movement of Pleistocene ice. The climate is cool and dry, with mean annual precipitation of about 40 cm and mean daily temperatures in the -5 to -10°C and 18 to 20°C ranges in January and July respectively.

BIOTIC FEATURES

The reserve is entirely forested. The most extensive forest community is the Douglas fir - lodgepole pine - kinnikinnick - pinegrass type. There has been some selective logging here, and regenerating trees include trembling aspen, lodgepole pine, and Douglas fir. Saskatoon, soopolallie, and prickly rose are common shrubs, while ground cover includes timber milk-vetch, wild strawberry, northern bedstraw, Indian paintbrush, rosy pussytoes, Holboell's rockcress, cut-leaved anemone, and various mosses and lichens. A community of more restricted extent, confined to the southern extremity of the reserve, is the ponderosa pine - needle and thread grass - bluebunch wheatgrass type, found here at or near its northern limit in the province. Characteristic understory plants include rosy pussytoes, worm-leaved stonecrop, timber milk-vetch, northern and dryland goldenrod, pine-grass, junegrass, kinnikinnick, common juniper, and northern bedstraw.

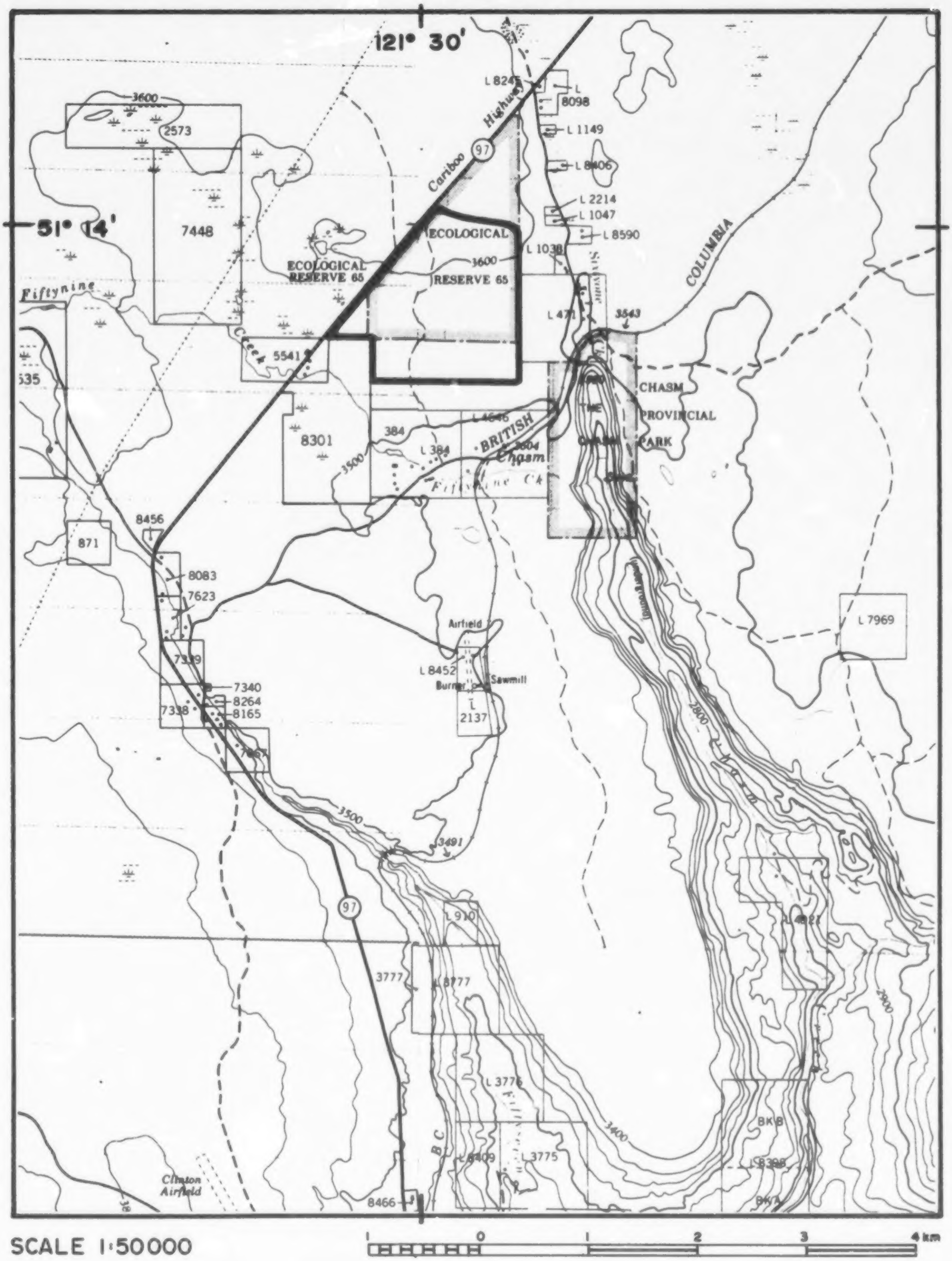
The fauna has not been surveyed, but a diversity of dry forest species is expected to occur.

OUTSTANDING FEATURES: Stands of ponderosa pine, of excellent growth, near the northern limit of occurrence of this species.

OTHER INFORMATION: Order-in-Council no. 2010, 12 June 1975, and no. 608, 25 March 1982 (boundary revision). Application no. 159. Map no. 92 P/3; P/4. Access from Highway 97, which borders the reserve.

Some of the reserve was logged many years ago, resulting in a mosaic of stand ages. Some veteran trees remain. One dirt road passes through the reserve, and old logging tracks are evident.

2-65B


121° 30'
51° 14'
3600
2573
7448
Fiftynine
Creek
5541
535
Cariboo Highway
97
ECOLOGICAL RESERVE 65
ECOLOGICAL
RESERVE 65
L 8245
L 8098
L 1149
L 8406
L 2214
L 1047
L 8590
L 1038
L 471
3543
COLUMBIA
CHASM
PROVINCIAL
PARK
THE CHASM
L 4646
384
L 384
BRITISH
Chasm
3604
8301
3500
Fiftynine Ck
8456
871
8083
7623
Airfield
L 8452
Burner
Sawmill
L 2137
7339
7340
8264
8165
7338
7667
3491
L 7969
2800
L 910
3777
L 3777
L 3776
L 4821
3400
BC
L 8409
L 3775
BK 8
L 8398
BK 1
Clinton Airfield
8466
2800
0
1
2
3
4 km

SCALE 1:50000

N.T.S. No. 92 P/3,4

ECOLOGICAL RESERVE No. 65
CHASM

TEN MILE POINT

E.R. #66

PURPOSE: To provide an undisturbed, intertidal and subtidal study area accessible by car in the Greater Victoria area

LOCATION: At Cadboro Point, 3.5 km SE of the University of Victoria

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SIZE: 11 ha LAT: 48°27'N LONG: 123°16'W ELEVATION: -11 to 5 m

BIOGEOCLIMATIC ZONE: Coastal Douglas Fir

PHYSICAL FEATURES:

The reserve includes about 450 m of intertidal shoreline along Cadboro Point, and extends seaward for 300-400 m. About 30% of its area is above mean low water, 70% below. Coastal features include a sheltered cove (Maynard Bay), rocky headlands, tidepools, ripcurrent channels, and four barren islets accessible at low tide. Intertidal substrates are about 80% bedrock, 10% mixed sand-gravel-mud, and 10% sorted gravel. A large intertidal area is exposed at low tide.

BIOTIC FEATURES:

Zonation on the rocky shore is typical of southern Vancouver Island. A band of yellow lichen occupies the upper splash zone, followed by a black lichen (Verrucaria) zone which frequently contains the green alga Prasiola. Below this is a sparsely populated band having a few strands of attached green algae and small barnacles, then a wide rockweed (Fucus) zone extending to low water. A few winkles and limpets occur above and within the rockweed zone.

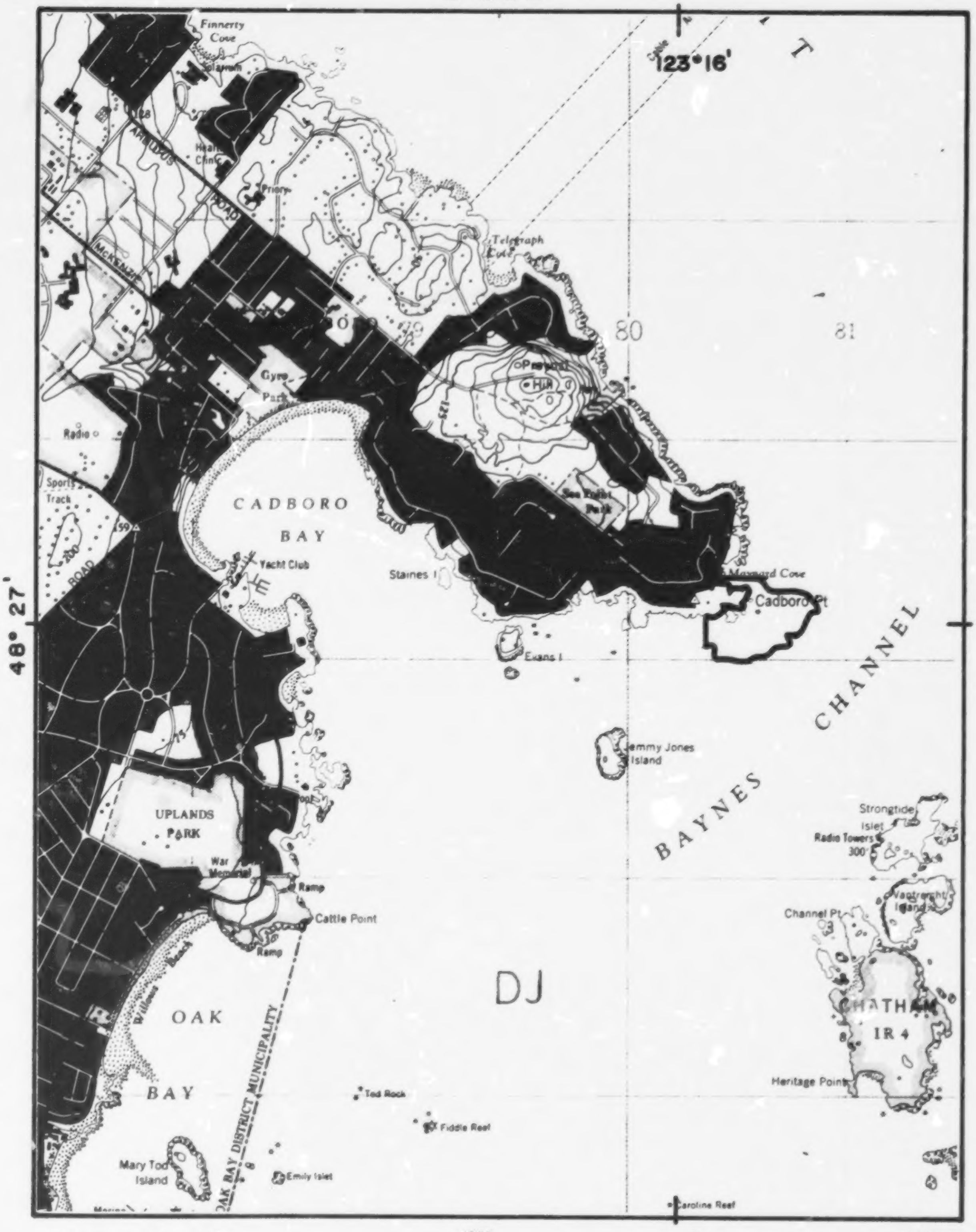
Forty two species of algae have been noted at 1 to 8 m depths in Maynard Bay. The only common green alga is Ulva sp. Significant brown algae are Costaria costata, Desmarestia intermedia, D. ligulata, and Laminaria spp. Among the 32 species of red algae, many of which form a low turf, Ceramium sp, Odonthalia floccosa, Plocamium violaceum, P. tenue, Laurencia spectabilis, and Callophyllis flabellulata are quite widespread.

Typical invertebrates on subtidal bedrock and boulder sites in Maynard Bay are barnacles (Balanus cariosus, B. nubilus), red sea cucumbers, ochre stars, black and gum-boot chitons, sea anemones, pinto abalone, and giant red sea urchins. Inhabitants of mud, sand and shell substrates include the blood star, California cucumber, butter clam, and cockle. At least 55 species of invertebrates have been recorded in the reserve, of which molluscs, crustaceans, and echinoderms are notably diverse.

OUTSTANDING FEATURES: Marine environments accessible by land, within minutes, for researchers and students in the Greater Victoria area.

OTHER INFORMATION: Order-in-Council no. 3293, 24 October 1975. Application no. 168. Map no. 92 B/6f. Marine chart no. 3423. Accessible by road. Reports are available listing marine algae and invertebrates.

2-66B


Finnerty Cove
Arbutus Road
McKenzie
Road
123° 16'
Telegraph Cove
80
81
Prospect Hill
Gyro Park
Radio
Sports Track
CADBORO BAY
Yacht Club
Staines I
Maynard Cove
Cadboro Pt
48° 27'
Evans I
Jemmy Jones Island
BAYNES CHANNEL
Strongtide Islet
Radio Towers 300'
Vantreight Island
Channel Pt
CHATHAM IR 4
Heritage Point
UPLANDS PARK
War Memorial
Ramp
Cattle Point
Ramp
Willows Beach
OAK BAY
OAK BAY DISTRICT MUNICIPALITY
DJ
Tod Rock
Fiddle Reef
Mary Tod Island
Emily Islet
Caroline Reef

SCALE 1:25 000

1000 0 1000 metres

N.T.S.No. 92 B/6f

ECOLOGICAL RESERVE No 66
TEN MILE POINT

SATELLITE CHANNEL E.R. #67

PURPOSF: To conserve rich benthic communities typical of fine-grained, level-bottom environments in the southern Gulf of Georgia

LOCATION: In central Satellite Channel, between the Saanich Peninsula and Saltspring Island, 5 km NNW of Patricia Bay

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SIZE: 343 ha LAT: 48°42'N LONG: 123°29'W ELEVATION: -82 to 0 m

BIOGEOCLIMATIC ZONE: Not applicable

PHYSICAL FEATURES:

The reserve consists only of sea floor habitat. Most of the width of Satellite Channel is included, the northern boundary coming within 200 m of the Saltspring Island shoreline at Cape Keppel, the southern edge within 200 m of the Saanich Peninsula on the north side of Moses Point. Most of the reserve has a relatively level bottom under water depths of 55 to 80 m. The shallowest areas, about 18 m, are at the southwest corner. The fine-grained bottom sediments consist of 62% sand, 24% silt, and 14% clay.

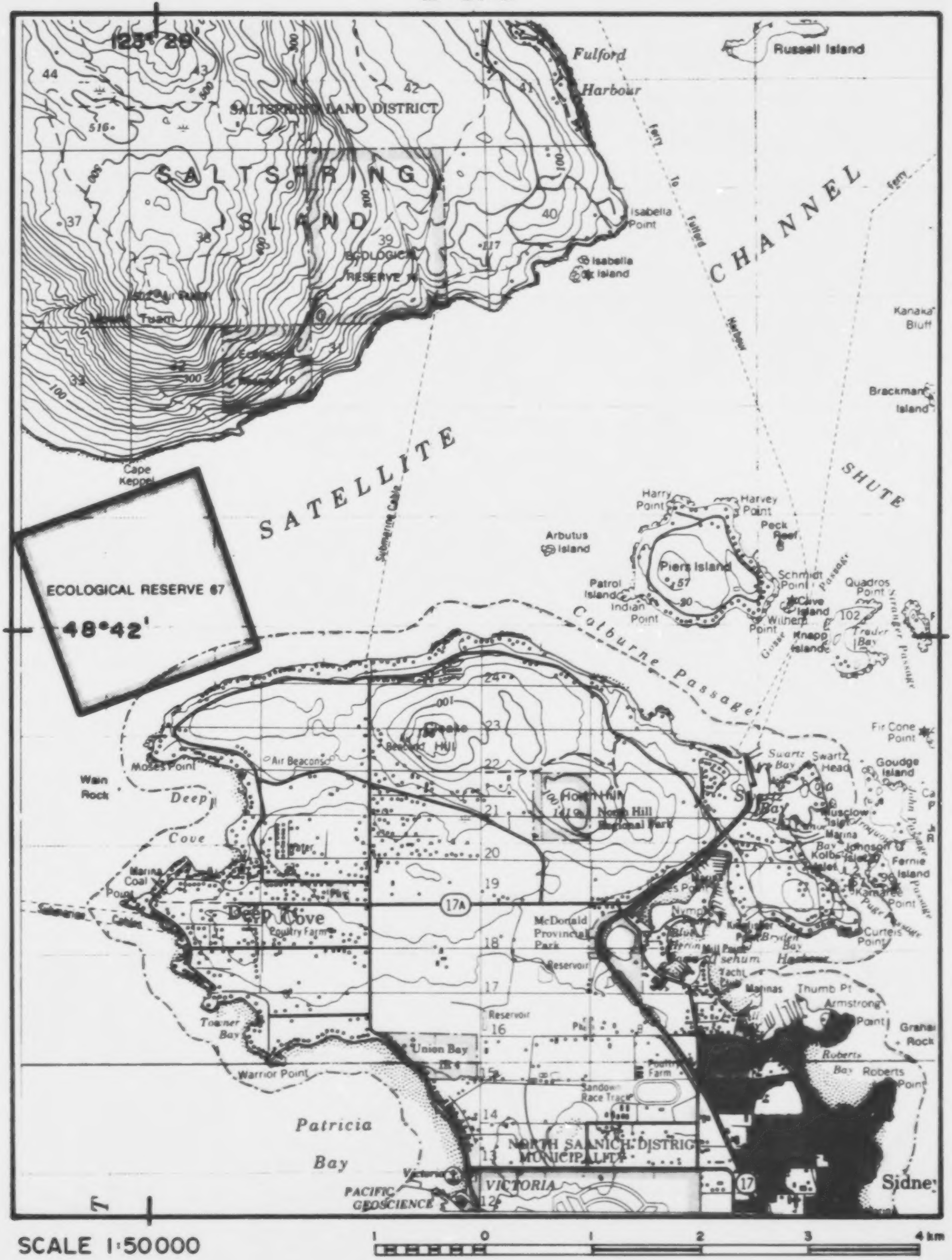
BIOTIC FEATURES:

The benthic infauna is diverse in species and high in biomass. At least 67 species occur, of which bivalve and gastropod molluscs, errant and sedentary polychaetes, and echinoderms are particularly diverse. Repeated sampling has indicated nine species to be ecologically significant, based on defined criteria. These nine are errant polychaetes of the genera Lumbrinereis and Nephtys; the sedentary polychaetes Maldane glebifex, Sternaspis fossor, and a Prionospio; the pelecypods Compsomyax subdiaphana, Macoma elimata, and Yoldia ensifera; and the brittle star Ophiura sarsi. Studies over time have shown this community to be stable.

The benthic community has thousands of organisms per square meter largely due to thick masses of two tubicolous polychaetes, Maldane glebifex and Prionospio sp. It also has a heavy standing crop, with a dry-weight biomass of about 60 g/m^2, largely attributable to the large pelecypod Compsomyax subdiaphana and other large species including Lumbrinereis, Travisia, Macoma, Yoldia, and a holothurian, Molpadia intermedia. Standing crops to the east and west of the reserve tend to be lower.

OUTSTANDING FEATURES: The only completely subtidal reserve in British Columbia. Very high diversity and production of benthic infauna.

OTHER INFORMATION: Order-in-Council no. 3294, 24 October 1975. Application no. 172. Map no. 92 B/11. Marine chart no. 3452. Research on faunal stability, diversity and biomass has been undertaken by University of Victoria biologists since 1965.


123° 29'
SALTSPRING LAND DISTRICT
SALTSPRING ISLAND
Fulford Harbour
Russell Island
Isabella Point
Isabella Island
ECOLOGICAL RESERVE
Mount Tuam
CHANNEL
ferry to Fulford Harbour
Kanaka Bluff
Brackman Island
Cape Keppel
SATELLITE
Submarine Cable
SHUTE
ECOLOGICAL RESERVE 67
48°42'
Arbutus Island
Harry Point
Harvey Point
Peck Reef
Piers Island
Patrol Island
Indian Point
Schmidt Point
Quadros Point
Wilhelm Point
Knapp Island
Colburne Passage
Stranger Passage
Tracer Bay
Fir Cone Point
Swartz Bay
Swartz Head
Goudge Island
Wain Rock
Moses Point
Air Beacons
Deep Cove
Horth Hill
North Hill Regional Park
Musclow Islet
Kolbert Islet
Johnson Islet
Fernie Island
Kamaree Point
Curteis Point
Marina
Coal Point
Deep Cove
Country Farm
17A
McDonald Provincial Park
Reservoir
Tsehum Harbour
Thumb Pt
Armstrong Point
Graham Rock
Roberts Bay
Roberts Point
Tsehum Harbour
Marinas
Yacht Club
Union Bay
Poultry Farm
Sandown Race Track
Tonner Bay
Warrior Point
Patricia Bay
NORTH SAANICH DISTRICT MUNICIPALITY
VICTORIA
PACIFIC GEOSCIENCE
17
Sidney

SCALE 1:50000

1 0 1 2 3 4 km

N.T.S. No. 92 B/11

ECOLOGICAL RESERVE No. 67
SATELLITE CHANNEL

GLADYS LAKE

E.R. #68

PURPOSE: To provide an alpine - subalpine study area containing unharvested large mammal populations, and to protect Spruce - Willow - Birch and Alpine Tundra ecosystems

LOCATION: Eaglenest Range, 65 km ESE of Iskut

SIZE: 48,560 ha LAT: 57°29' - 57°44'N LONG: 128°37' - 129°05'W
ELEVATION: 1200 - 2515 m

BIOGEOCLIMATIC ZONES: Spruce - Willow - Birch; Alpine Tundra

PHYSICAL FEATURES:

In size alone this ecological reserve is unique, being the largest in the province, comprising over 30% of land area in the system. Completely surrounded by Spatsizi Wilderness Park, this spectacular reserve encloses the rugged central block of the Eaglenest Range, composed of folded volcanic and sedimentary rock. Most peaks and high ridges are jagged and serrate due to alpine glaciation and have cirque basins on their north and northeast faces, some containing alpine glaciers and others now ice-free. Evidence of formerly more extensive alpine glaciation includes moraines and kame and kettle topography in the valleys. Other alpine features are solifluction lobes, discontinuous permafrost, patterned ground, and boulder stripes.

Surficial materials are mostly glacial drift or gravitational deposits such as talus. Physical features of importance to wildlife include south-facing slopes having high insolation, caves used for shelter, both wet and dry mineral licks, and cliffs used by nesting raptors. In winter, temperature inversions and chinook winds frequently benefit ungulates on these high elevation ranges.

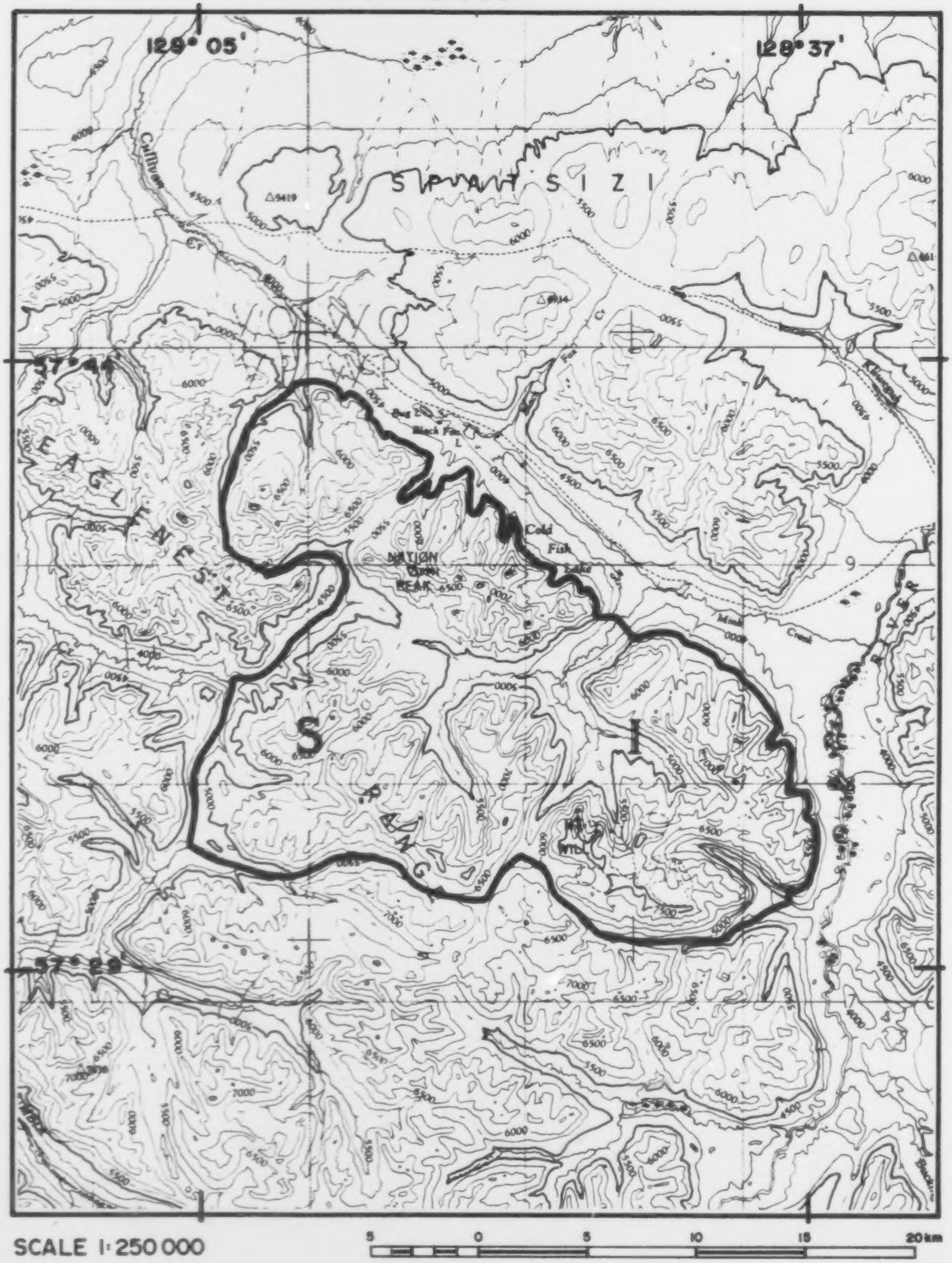
Gladys Lake, 60 ha in size, is a central feature of the reserve. Streams draining four or five major valleys converge on the lake, which then drains into Cold Fish Lake and the Spatsizi River.

The climate is generally cold and continental, with frequent summer rain. Snow and frost may occur at any time, especially at higher elevations.

BIOTIC FEATURES:

Despite the high elevation and harsh climate of this reserve, a surprising diversity of plant communities and species has been described. Twenty-one communities have been documented and additional types occur in specialized sites. An impressive 370 species of vascular plants have been identified, making this one of the floristically best known reserves in the province.

Lower valleys and slopes, up to the 1500 - 1700 m level, support communities typical of the Spruce - Willow - Birch Zone. Open forest types characterized by white spruce, grey-leaved willow, and scrub birch or by subalpine fir, scrub birch, and crowberry are widespread. The shrub stands are usually dense; trees in the subalpine fir type may be of a krummholz form. Small areas of closed white spruce, lodgepole pine, or subalpine fir


129° 05'
128° 37'
57° 44'
57° 29'
SPATSIZI
EAGLE NEST
S
I
RANGE
Cold Fish Lake
Black Fox L
Mink Creek
NATION
5
0
5
10
15
20km

SCALE 1:250 000

N.T.S. No. 104 H

ECOLOGICAL RESERVE No. 68
GLADYS LAKE

woods occur in favorable locations, and stands of trembling aspen and balsam poplar of poor stature are present on some middle elevation slopes. The most extensive subalpine shrub communities are the grey leaved willow - scrub birch - Altai fescue, and scrub birch - Altai fescue - lichen types. Willow-dominated communities also occur in valley bottom fens, along streams, on wet alluvial fans, and on burned slopes. A dry community characterized by common juniper, kinnikinnick, and grasses is fairly common on colluvial slopes to the 1630 m level. Herbaceous subalpine communities are commonly dominated by Altai fescue.

Alpine tundra communities are well developed above the 1675 m level and include dwarf shrub, heath, seepage, tundra, and fellfield types. Heath types characterized by white mountain-heather, mountain avens, netted willow, polar willow, or bryophytes are extensive between the 1675 and 1800 m elevations, while tundra characterized by dwarf willows, Altai fescue, small-awned sedge, or lichen communities occurs on the highest vegetated terrain.

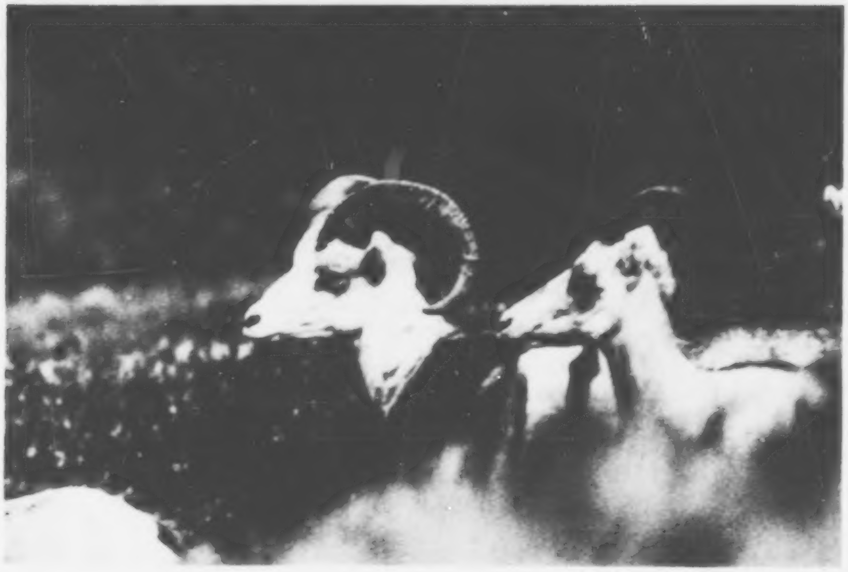
Thirty five species of vascular plants in the reserve are listed as rare in the province, of which 14 are in the category of greatest rarity. These are arctic rush (*Juncus arcticus* var. *alaskanus*), two-flowered rush (*J. biglumis*), northern wood-rush (*Luzula confusa*), Raup's willow (*Salix raupii*), sulphur buttercup (*Ranunculus sulphureus*), pale poppy (*Papaver alboroseum*), gray-leaved whitlow-grass (*Draba cinerea*), Austrian whitlow-grass (*D. fladnizensis*), lance-fruited whitlow-grass (*D. lonchocarpa* var. *thompsonii*), thyme-leaved saxifrage (*Saxifraga serpyllifolia*), field locoweed (*Oxytropis campestris* var. *jordalii*), Huddelson's locoweed (*O. huddelsonii*), swamp willowherb (*Epilobium davuricum*), and Gorman's douglasia (*Douglasia gormanii*).

The reserve and surrounding area is renowned for its abundance of wildlife. Twenty six species of mammals have been documented. An estimated 30 - 45 mountain goats and 60 - 70 Stone sheep find year-round range in the reserve, the former on sparsely vegetated rocky ridges, the latter on grassy slopes. A few moose are present year-round, being confined to valley bottom willow stands near Gladys Lake in winter. Mountain caribou are present primarily in summer when up to 30 cows may use the high ridges as scattered calving sites. Grizzly bears, wolves, and wolverines move in and out of the reserve which, despite its large size, is too small to contain home ranges of these highly mobile species. A variety of smaller mammals is present, including beaver, snowshoe hares, hoary marmots, arctic ground squirrels, lemmings, and voles. These are an important food source for predatory birds and mammals. Sixty eight species of birds have been recorded here.

OUTSTANDING FEATURES: This large reserve contains a diversity of alpine - subalpine ecosystems, many rare plants, resident mountain goat and Stone sheep herds, and seasonal habitat of importance to caribou and moose.

OTHER INFORMATION: Order-in-Council no. 3678, 28 November 1975 and 726, 19 March 1981 (boundary revision). Application no. 128. Map no. 104 H (1:250,000). Access via foot, horseback, or float plane to Cold Fish Lake. A research cabin is present at Gladys Lake where pioneering studies of Stone sheep were carried out.

Reports are available on vegetation and wildlife in the reserve.



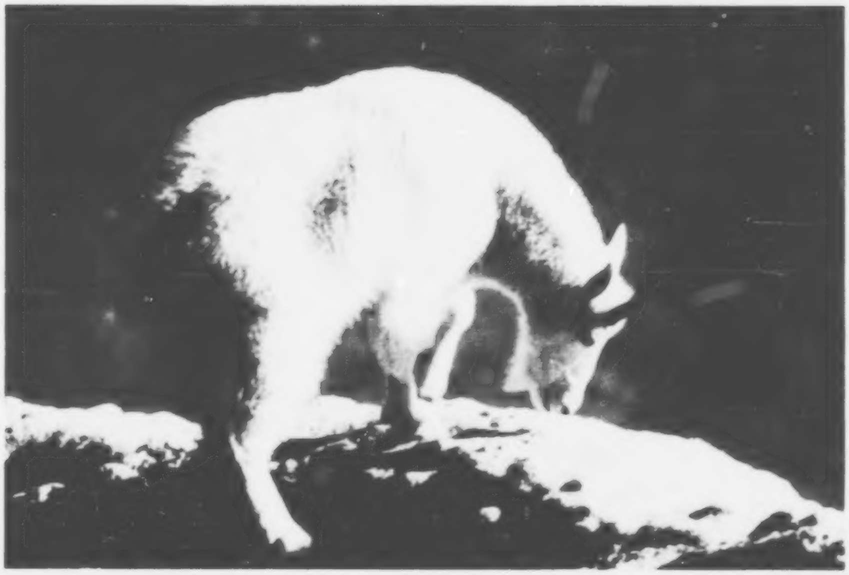


Figure 9. Big Game Research in the Gladys Lake Ecological Reserve (#68)

The opportunity of conducting long-term research on non-hunted big game populations was the chief reason for establishing the Gladys Lake Ecological Reserve (#68) on the Spatsizi plateau. This reserve, the largest (48,560 ha) in British Columbia, offers year-round range for Stone sheep (upper photo) and mountain goat (lower photo), and includes important seasonal habitat for Osborne caribou, moose, wolves and grizzly bear. The Gladys Lake Reserve includes undisturbed representative plant communities of the Spruce-Willow-Birch and Alpine tundra zones. (Photos B. Foster)

BAYNES ISLAND E.R. #69

PURPOSE: To preserve floodplain cottonwood stands for purposes of hybridization and stock improvement

LOCATION: In Squamish River, 10 km N of Squamish

SIZE: 71 ha LAT: 49°46'N LONG: 123°10'W ELEVATION: 10 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

The reserve is an island on the Squamish River floodplain, surrounded by mountains of the Coast Range which rise to over 2000 m. Baynes Island is located where the active, high-gradient Cheakamus River enters the lower gradient Squamish (1.25 m/km) and deposits much of its coarse-grained bedload. The Squamish River is subjected to extreme variations in flow, the lowest recorded daily flow (11 m^3/s) being 200 times less than the maximum daily flow (2,240 m^3/s). Rainfall and snowmelt events result in frequent flooding of valley bottom lands, and in erosion and deposition of material. The highest mean monthly flows are normally in June, the lowest in March. Baynes Island soils are largely poorly developed Regosols on alluvial deposits. Local climatic events include fall and winter storms funnelled up Howe Sound between high mountains, strong outflow winds ("Squamish winds") in winter, and summertime convective showers. Total annual precipitation is just over 200 cm.

BIOTIC FEATURES:

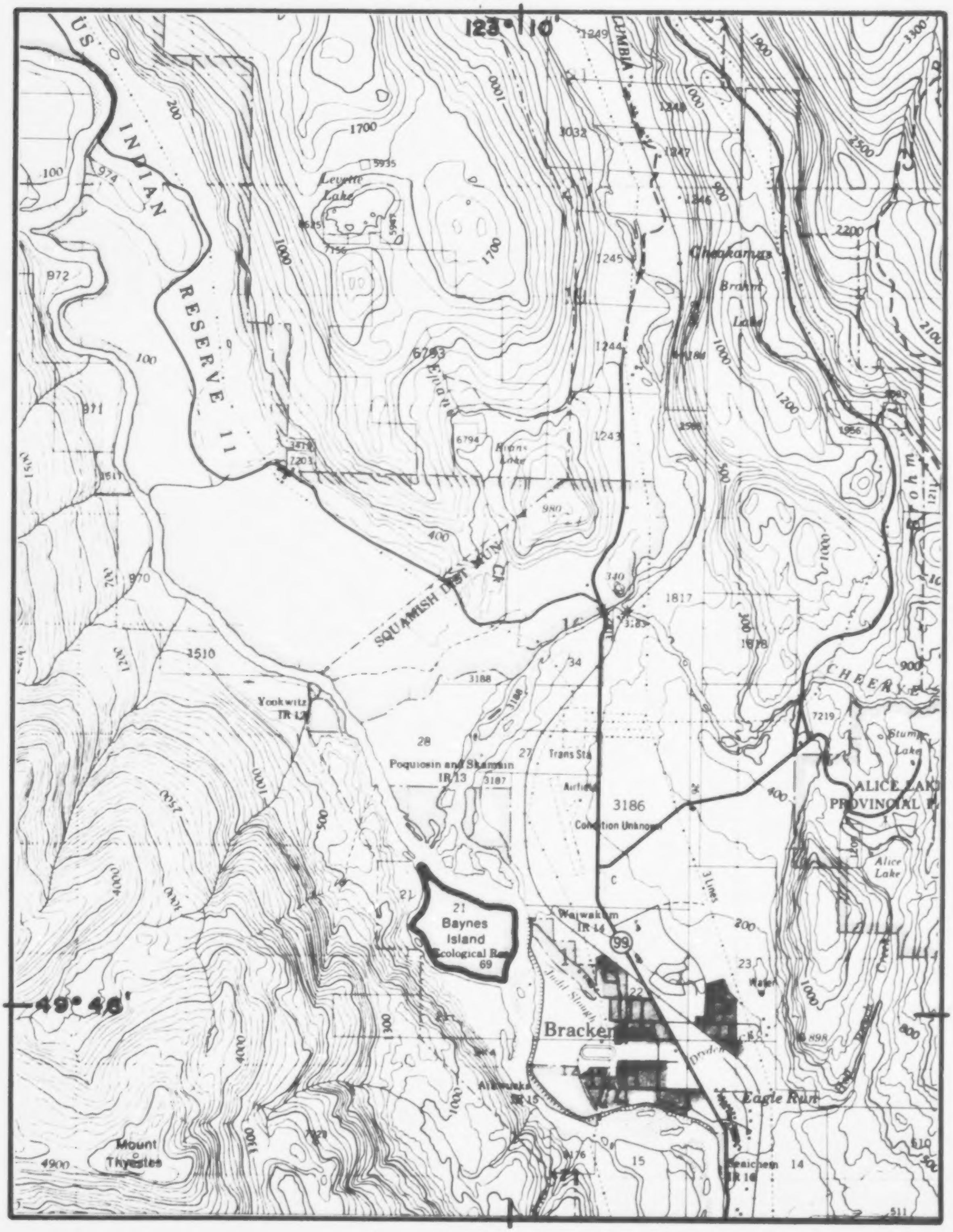
Baynes Island, except for narrow gravel bars at its perimeter, is completely forested. One community of shrubs and four forest communities have been described. Shrub stands, of limited extent, are dominated by the tall shrubs Pacific willow and Pacific ninebark. Black cottonwood - red alder woods, with an understory of salmonberry and red-osier dogwood, cover much of the island. On drier sites the cottonwood stands contain bigleaf and vine maples, and hazelnut is a common understory shrub. Lastly, wet depressions support red alder trees in association with red-osier dogwood, skunk cabbage, and water-parsley. Additional trees recorded on the island are grand fir, Sitka spruce, and western redcedar. Four species of ferns and 7 of mosses have been noted.

A variety of birds, including warblers, thrushes, wrens, woodpeckers, chickadees, juncos, and kinglets has been observed in the reserve.

OUTSTANDING FEATURES: This is the only remaining floodplain site in the lower Squamish River valley having pristine vegetation.

OTHER INFORMATION: Order-in-Council no. 3762, 4 December 1975. Application no. 185. Map no. 92 G/14. Access by boat across Squamish River.

2-69B


123° 10'
49° 46'
INDIAN RESERVE 11
Levette Lake
Cheakamus
Brohm Lake
Evans Lake
SQUAMISH DIST MUN
Yookwitz IR 12
Poquiosin and Skamain IR 13
Trans Sta
Airfield
Condition Unknown
21
Baynes Island Ecological Re 69
Waiwakum IR 14
99
Brackendale
Judd Slough
Eagle Run
Stump Lake
ALICE LAKE PROVINCIAL P
Alice Lake
Brohm
Mount Thyestes
Aikwucks IR 15
Seaichem IR 16
1
0
1
2
3
4km

SCALE 1:50 000

N.T.S. No. 92 G/14

ECOLOGICAL RESERVE No. 69
BAYNES ISLAND

MOUNT TINSDALE

E.R. #70

PURPOSE: To maintain undisturbed examples of subalpine parkland and alpine ecosystems in the Quesnel Highland for research

LOCATION: Palmer Range, 18 km ESE of Barkerville

SIZE: 419 ha LAT: 53°01'N LONG: 121°16'W ELEVATION: 1675 - 2140 m

BIOGEOCLIMATIC ZONES: Engelmann Spruce - Subalpine Fir; Alpine Tundra

PHYSICAL FEATURES:

The Palmer Range, an upland within the Shuswap Highland, trends from northwest to southeast and has summits about 2130 m in elevation. These were over-ridden by Pleistocene ice resulting in generally rounded profiles, and then subsequently dissected by local alpine glaciers and stream erosion. The reserve contains the centrally located Mount Tinsdale and summits to the northwest and southwest. From the northwest-southeast alpine backbone of the reserve the terrain falls away fairly gently to the southwest but more sharply to the northeast. Local alpine glaciers, long since melted, have formed a series of cirque basins along the northeast slopes of the reserve, giving a scalloped appearance in plan view.

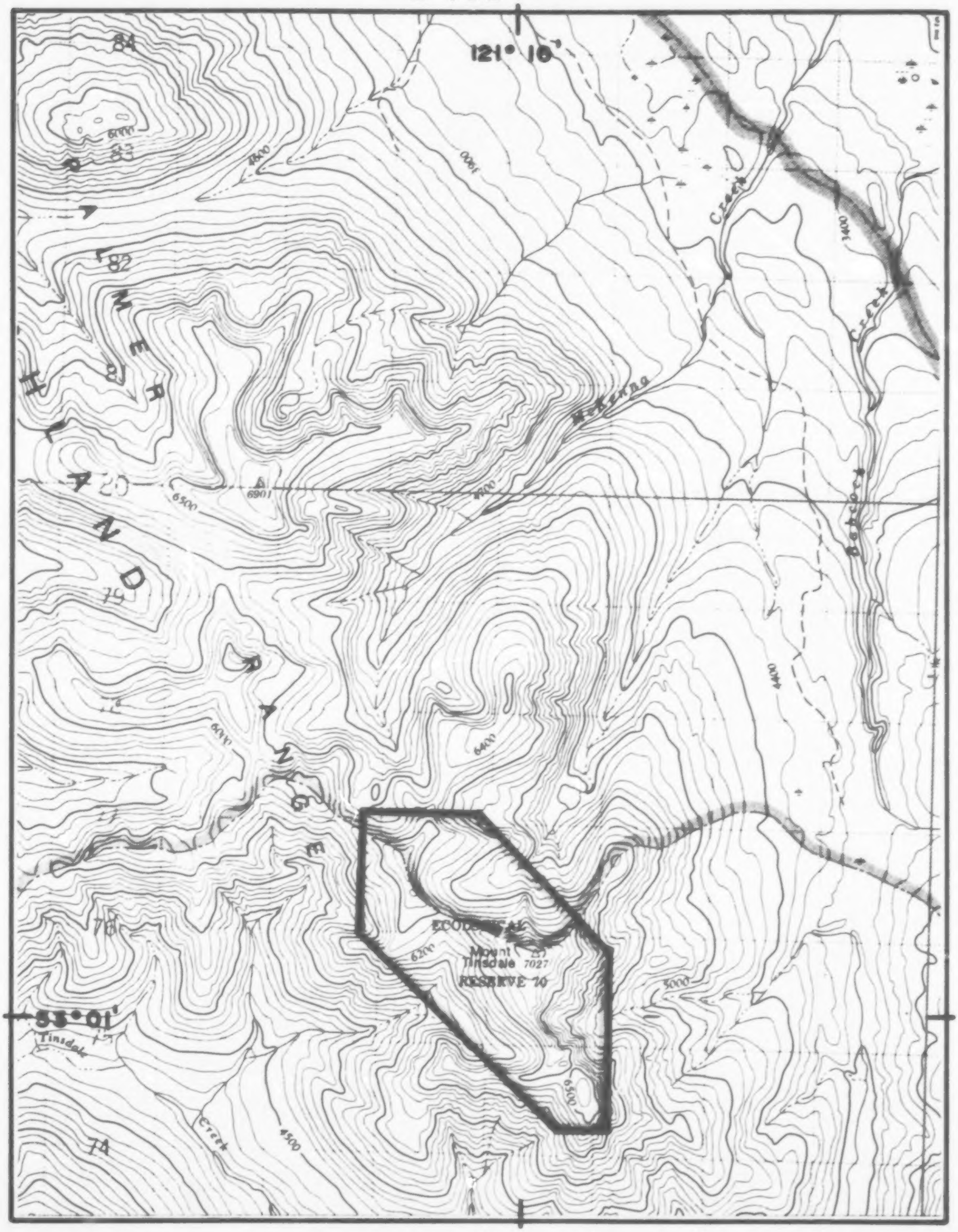
BIOTIC FEATURES:

Considerable gently sloping terrain with good soil cover, located from just below to just above timberline, results in a broad transition zone between subalpine forest and alpine tundra. This parkland and krummholz zone is a major feature of the reserve. At the lowest elevations a few fairly dense stands of spruce-fir forest are present, while extensive alplands occur above the parkland zone.

Eight communities have been described in the alpine zone. Two lichen-dominated types in which moss campion may be prominent occur on rocky outcrops. Soils with a high content of frost-shattered rock support associations characterized by one-flowered cinquefoil and alpine bluegrass, or by alpine fescue and common juniper. Communities dominated by three species of mountain-heather and by entire-leaved white mountain-avens are widespread on well-drained slopes, while species like sibbaldia and snow willow characterize two communities in sites of late snow melt. Dominant species in the subalpine forest are subalpine fir and dwarf blueberry.

The fauna has not been surveyed, although excellent habitat for grizzly bears and mountain caribou is present in the reserve.

OTHER INFORMATION: Order-in-Council no. 3763, 4 December 1975. Application no. 233. Map no. 93 H/3. Access to vicinity of reserve via logging road southeast from Barkerville. Full day hike needed to reach reserve from nearest road.


121° 16'
84
83
82
81
80
79
78
74
PALMER
HLAND
RANGE
6901
6500
6000
6400
6200
5000
4800
4500
4400
3400
McKenna
Creek
Babcock
Creek
Tinsdale
ECOLOGICAL
Mount
Tinsdale
7027
RESERVE 70
53° 01'
SCALE 1:50000
1 0 1 2 3 4 km

N.T.S. No. 93 H/3

ECOLOGICAL RESERVE No. 70
MOUNT TINSDALE

BLACKWATER CREEK

E.R. #71

PURPOSE: Protection of a site for research on sub-boreal forest types on a poor site, adjacent bogland, and intermediate vegetation types

LOCATION: Between Blackwater Creek and Williston Lake, 43 km NW of Mackenzie

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SIZE: 234 ha LAT: 55°34'N LONG: 123°38'W ELEVATION: 730 m

BIOGEOCLIMATIC ZONE: Sub-boreal Spruce

PHYSICAL FEATURES:

The reserve is located on a flat outwash plain about 15 km west of the Parsnip Reach of Williston Lake. It encompasses the southern end of a huge treeless bog which stretches to the north, parallel to Blackwater Creek. Low hills rise to the east, between the reserve and Williston Lake, and the higher Omineca Mountains are to the west. While part of the reserve is boggy, drainage is unorganized and no streams or lakes are present. Soils vary from Organic to Podzolic in nature and are developed on extensive glacial outwash.

Climate in this area, based on records for Germansen Landing, is characterized by mean daily January and July temperatures of -18°C and 14°C respectively and annual precipitation of 52 cm, 50% of which falls as snow.

BIOTIC FEATURES:

The reserve contains extensive, dense, coniferous forest stands, open bogland, and transitional areas in which tree islands give a parkland appearance. About 20% of the area, located in the central and northern part of the reserve, is bogland.

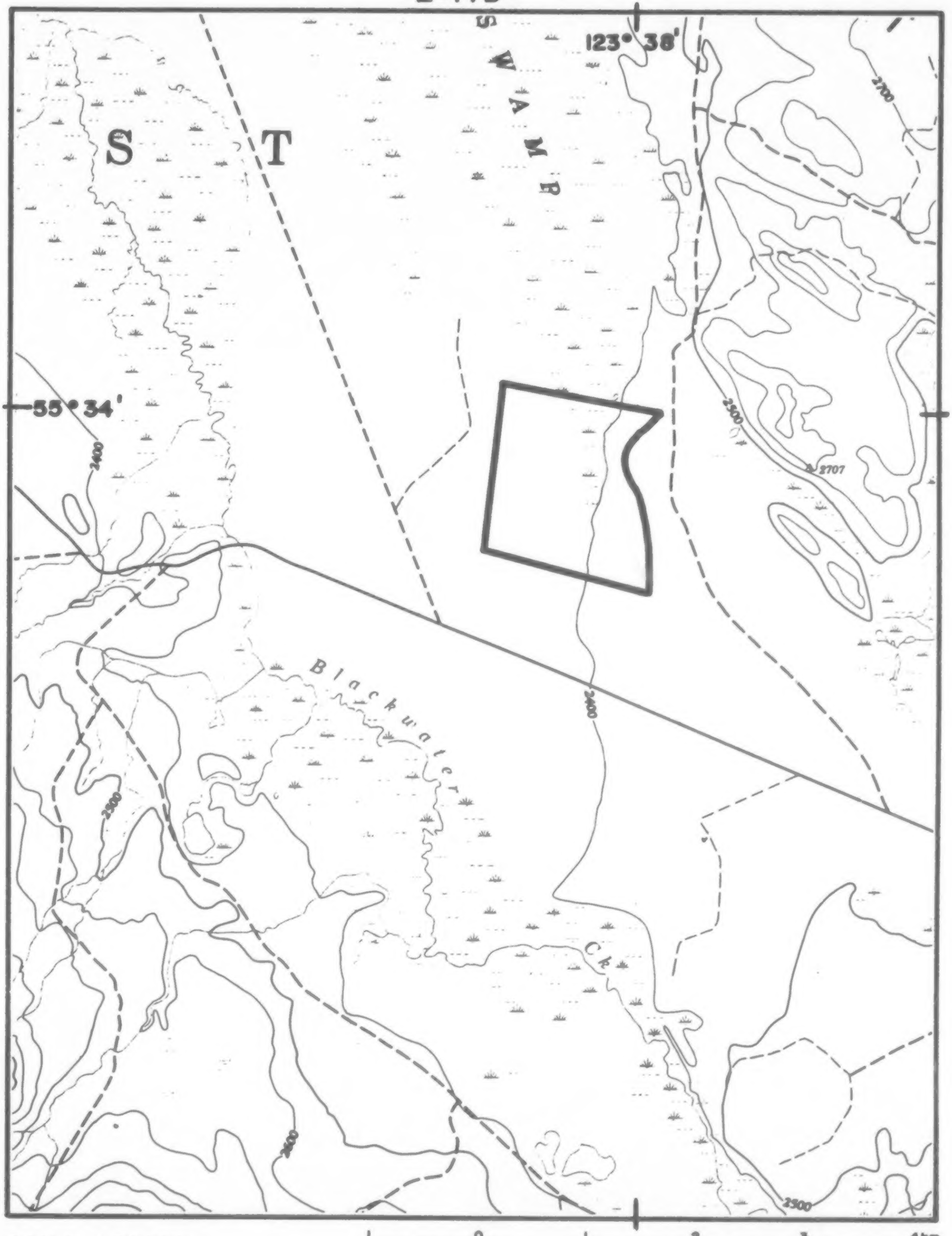
Upland forests may be dominated by lodgepole pine, white spruce, or black spruce, but some trembling aspen and balsam poplar is also present. Pine stands have an understory dominated by dwarf blueberry, kinnikinnick, lichens and mosses. In white spruce woodlands, black huckleberry and mosses are typical, while black spruce stands are characterized by bunchberry and mosses. A bog forest type, transitional between upland forest and treeless bogs, consists of black spruce, scrub birch, and several mosses including sphagnum.

Three treeless bog communities have been described, all dominated by scrub birch and mosses, including both sphagnum and other types of moss. Bog cranberry is co-dominant with scrub birch in some locations. Wettest areas in the bogs are characterized by a buckbean - marsh cinquefoil - swamp horsetail association. Many other plants are present.

The fauna has not been surveyed, but is not expected to be diverse.

OTHER INFORMATION: Order-in-Council no. 3764, 4 December 1975. Application no. 221. Map no. 93 O/12. Access is available via logging roads which pass within 1 km of the reserve.

2-71B



123° 38'
55° 34'
S
T
SWAMP
Blackwater Ck
2700
2500
2707
2400
2300

SCALE 1:50000

1 0 1 2 3 4km

N.T.S. No. 93 O/12

ECOLOGICAL RESERVE No. 71
BLACKWATER CREEK

NECHAKO RIVER E.R. #72

PURPOSE: To protect the most vigorous known tamarack stands west of the Rocky Mountains for genetic stock

LOCATION: 30 km W of Prince George; 2.5 km SE of Isle Pierre

SIZE: 133 ha LAT: 53°56'N LONG: 123°14'W ELEVATION: 670 - 715 m

BIOGEOCLIMATIC ZONE: Sub-Boreal Spruce

PHYSICAL FEATURES:

The reserve lies on relatively flat benchlands above the Nechako River, in an area occupied by a glacial lake during melting of Pleistocene glaciers. Glacial-lake clays underlie much of this area. A shallow, boggy, flat-bottomed depression, apparently an old meltwater channel or former course of the Nechako River, crosses the reserve from northwest to southeast. Saturated organic soils occur in this depression; adjacent upland soils are believed to be Brunisols.

BIOTIC FEATURES:

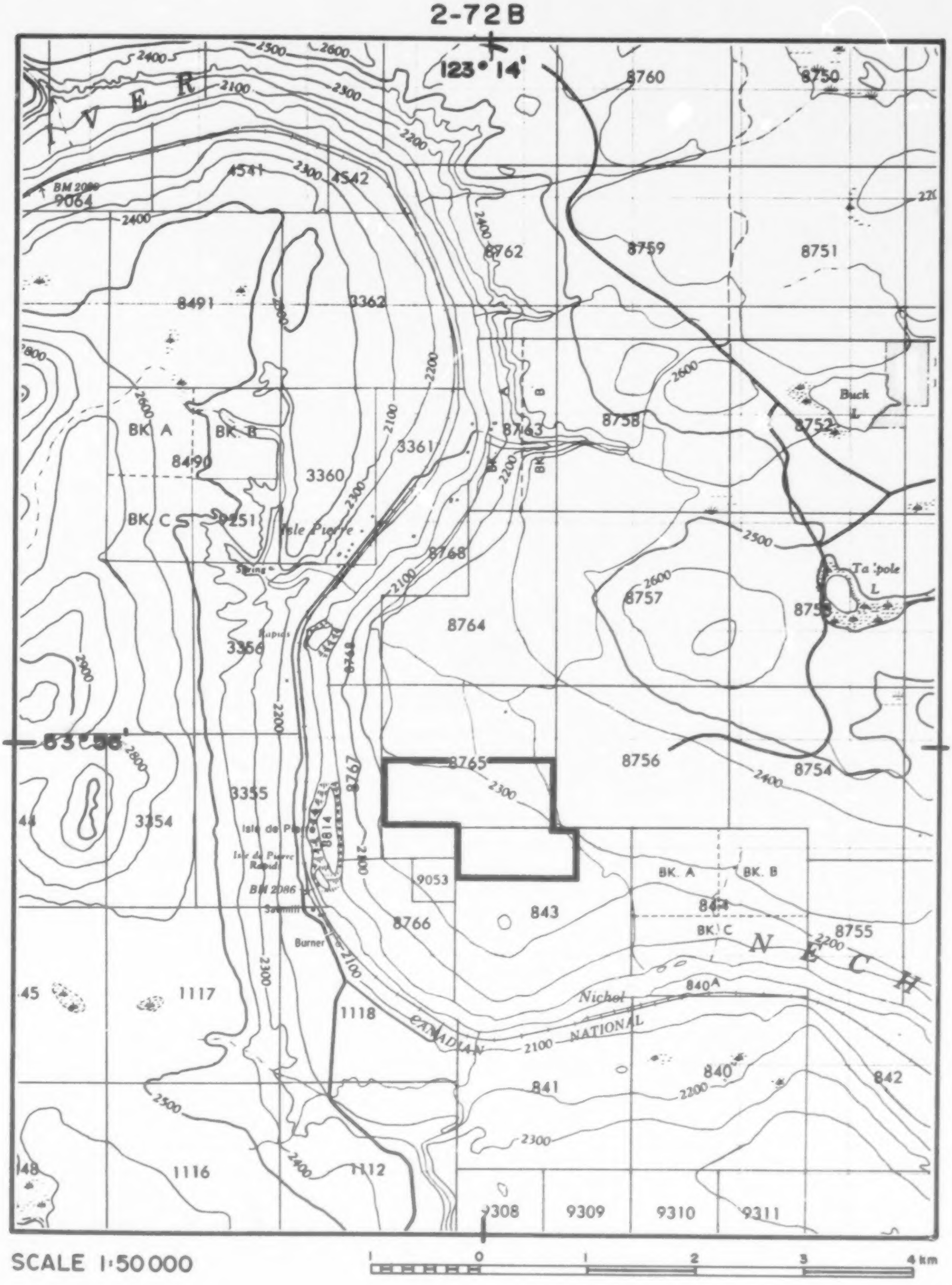
The flat depression across the middle of the reserve contains the vegetation types of major interest, including fairly open stands of tamarack trees of good size for this species. The stands of more or less pure tamarack are characterized by an understory of scrub birch, bluejoint grass, several species of sedges, and sphagnum moss. Black arboreal lichens are abundant on the tamarack trees. Mixed black spruce - tamarack boglands in which sphagnum moss dominates the ground cover are also present. Small standing water areas among the bog forest support a water sedge - buckbean association.

Upland forests on level ground are dominated by white and Engelmann spruce or their hybrids. Two spruce communities have been noted, one with an understory dominated by dwarf blueberry and lingonberry, and one characterized by black twinberry, common horsetail, and mosses. A low south-facing slope along the north edge of the central depression has mixed, scattered tree cover made up of spruces, lodgepole pine, trembling aspen, and the occasional Douglas fir. Bunchberry, kinnikinnick, and mosses characterize the ground cover. Additional trees found in the reserve are subalpine fir and black cottonwood.

OUTSTANDING FEATURES: This site supports the best growth of tamarack in the Sub-boreal Spruce Zone, and is important for preservation of genetic stock for future establishment of this species in other locations.

OTHER INFORMATION: Order-in-Council no. 3765, 4 December 1975. Application no. 210. Map no. 93 G/14. Access via rough roads southwest of Buck Lake Park.

Parts of the upland have been logged, but the tamarack - black spruce bog forest appears to be in a natural state. A partial plant list is available.


2-72B
123° 14'
53° 56'
V E R
N E C H
Buck L
Tadpole L
Isle Pierre
Isle de Pierre
Isle de Pierre Rapids
BM 2086
BM 2080
Sawmill
Burner
Spring
Rapids
Nichol
CANADIAN NATIONAL
BK. A
BK. B
BK. C
8760
8750
4541
4542
9064
8762
8759
8751
8491
3362
8490
8758
8763
8752
3361
3360
9251
8768
8757
8753
3356
8764
8765
8756
8754
3355
3354
8767
8814
9053
843
844
8755
8766
840A
1117
1118
840
842
841
1116
1112
9308
9309
9310
9311
2100
2200
2300
2400
2500
2600
2800
SCALE 1:50000
1
0
1
2
3
4 km

N.T.S. No. 93 G/14

ECOLOGICAL RESERVE No. 72
NECHAKO RIVER

TORKELSEN LAKE

E.R. #73

PURPOSE: To retain an accessible northern bog-forest complex for research and educational uses

LOCATION: 50 km NE of Smithers; 4 km W of the north arm of Babine Lake

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SIZE: 182 ha LAT: 55°07'N LONG: 126°40'W ELEVATION: 855 - 885 m

BIOGEOCLIMATIC ZONE: Sub-boreal Spruce

PHYSICAL FEATURES:

This reserve is on the floor of a broad northeast-southwest trending valley flanked by mountains rising to 1200 m or higher. Except for a hill on its western side, most of the reserve is flat and boggy. It is located at a divide between streams draining into Babine Lake and into the Bulkley River. Aerial photos show prominent north-south glacial striations on the valley floor. Soils are predominantly Organic types in which plant materials are poorly decomposed. The climate, based on data for Babine, is characterized by annual precipitation of 60 cm (45% snow) and mean daily July and January temperatures of 13°C and -15°C respectively.

BIOTIC FEATURES:

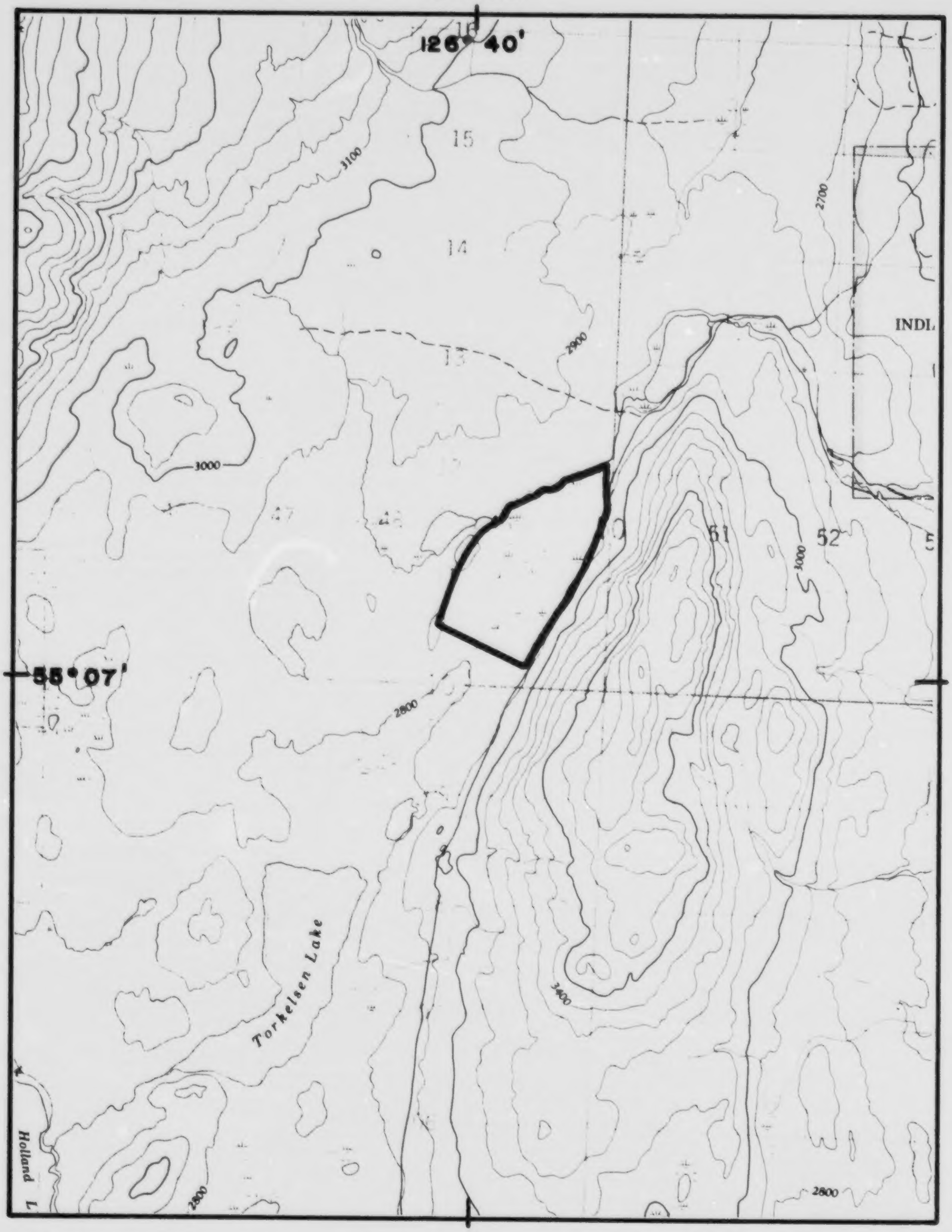
A mosaic of open bog, sparsely treed bog woodland, and dense forest is present. Three bog communities have been described, sphagnum moss being a component of all of them. Open shrubby bogs are dominated by grey-leaved and Barclay's willows, mountain alder, cloudberry, and sphagnum moss. Cloudberry is particularly abundant at this site. Forested bog communities include white and black spruce stands with ground cover dominated by four species of moss, and a white and black spruce type containing subalpine fir, palmate colt's-foot, and mosses. On higher ground the tree cover is comprised of white and Engelmann spruce hybrids and subalpine fir, and the understory is characterized by dwarf blueberry, black huckleberry, and several mosses among which sphagnum is not included. This reserve appears to be rich in species of mosses. Other trees present are lodgepole pine, paper birch, and black cottonwood.

The fauna has not been surveyed. Beaver dams are evident on air photos, and moose are known to be common in the area.

OTHER INFORMATION: Order-in-Council no. 3766, 4 December 1975. Application no. 198. Map no. 93 M/2. Access is possible on the road between Smithers and Babine village, which passes along the east boundary of the reserve.

At least two plants of extensive distribution in more northern regions, cloudberry (Rubus chamaemorus) and Lapland buttercup (Ranunculus lapponicus) occur here, perhaps as relicts from a time when the climate was colder.

2-73B


126° 40'
15
3100
14
13
2900
2700
INDL
3000
47
48
61
52
3000
55° 07'
2800
3400
Torkelsen Lake
Holland L
2800
2800

SCALE 1:50000

1
0
1
2
3
4 km

N.T.S. No. 93 M/2

ECOLOGICAL RESERVE No. 73
TORKELSEN LAKE

U.B.C. ENDOWMENT LANDS E.R. #74

PURPOSE: Preservation of second-growth forest ecosystems in a location of high demand by university educators and researchers

LOCATION: Southern edge of University of B.C. Endowment Lands, Vancouver

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SIZE: 90 ha LAT: 49°15'N LONG: 123°13'W ELEVATION: 30 - 60 m

BIOGEOCLIMATIC ZONE: Coastal Douglas Fir

PHYSICAL FEATURES:

The reserve is located on the south slope of Point Grey which consists almost entirely of Quadra sands and silts deposited in advance of the final or Fraser glaciation. These are mantled by 2 to 5 m of glacial till deposited by the glaciers which moved from north to south. These tills are known as Newton stony clays. Marine innundation occurred immediately following local glacier melt and prior to rebound of the land, resulting in a thin layer of marine material on top of the till. These surficial materials gave rise to the present soils, which are largely Podzols.

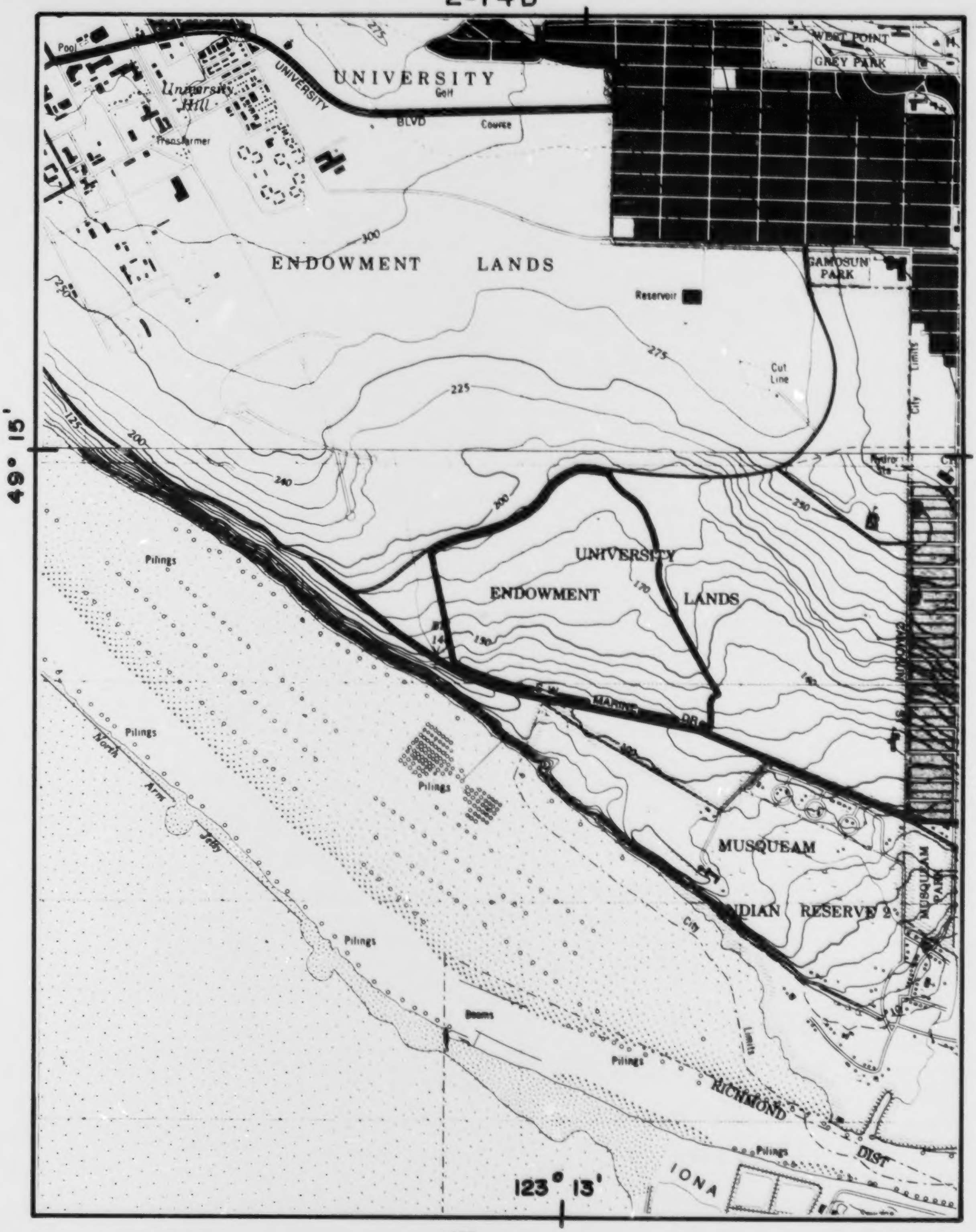
The reserve has a southerly aspect, with slopes of 3 to 5%. The topography is rolling as a result of several shallow stream valleys. Drainage is to the south into the north arm of the Fraser River. The small streams in the reserve usually dry up in summer.

The climate here, while moderate and marine in nature, has a dry summer typical of the Gulf of Georgia region. Total annual precipitation is about 120 cm, of which only 4% falls as snow.

BIOTIC FEATURES:

The reserve is entirely forested, mostly with advanced second growth stands. Three major forest communities have been described, the most extensive being the Douglas fir - grand fir - western redcedar - sword fern type. This occurs on mesic slopes and is an excellent site for Douglas fir growth. On drier sites the mosses *Stokesiella oregana* and *Hylocomium splendens* are common in the understory; in wet sites three-leaved foam flower and the mosses *Plagiomnium insigne* and *Leucolepis menziesii* are characteristic. On the highest parts of the reserve, approaching the Plateau surface of Point Grey and having Regosol-like soils, a red alder - Douglas fir - western redcedar - western hemlock - Oregon-grape - thimbleberry - moss association is present. Cedar may be absent on the driest sites. The third community, present in very wet areas along streams and in depressions, occupies a small part of the reserve and is often called the skunk cabbage community. Red alder, Sitka spruce and western redcedar are the dominant trees, while skunk cabbage is the common understory plant on the wettest sites. Water-parsley and the mosses *Rhizomnium perssonii* and *Leucolepis menziesii* are also characteristic of wet sites. On the slightly drier phase of this type, skunk cabbage occurs sparsley, and false lily-of-the-valley and the moss *Stokesiella praelonga* are characteristic.

2-74B


Pool
University Hill
UNIVERSITY
UNIVERSITY BLVD
Golf Course
Transformer
WEST POINT GREY PARK
275
300
ENDOWMENT LANDS
250
Reservoir
CAMOSUN PARK
275
Cut Line
225
City Limits
49° 15'
125
200
240
200
Hydro
250
UNIVERSITY ENDOWMENT LANDS
170
140
150
Pilings
Pilings
North Arm Jetty
S.W. MARINE DR
CAMOSUN ST
Pilings
MUSQUEAM INDIAN RESERVE 2
MUSQUEAM PARK
City Limits
Pilings
Booms
Pilings
RICHMOND DIST
Pilings
IONA
123° 13'

SCALE 1:25000

1000 0 1000 metres

N.T.S. No. 92 G/3g,
92 G/6b

ECOLOGICAL RESERVE No. 74
U.B.C. ENDOWMENT LANDS

At least 86 species of vascular plants are present on the U.B.C. Endowment Lands, most of which are expected to occur in the reserve. Two species of sedges (Carex amplifolia and C. hendersonii) are considered rare in British Columbia. Over 50 species of mosses and liverworts have been recorded.

Over 100 species of birds have been identified in the U.B.C. area, many of which probably occur in the reserve. Noteworthy at the time of designation of this reserve was a nesting colony of great blue herons which varied between 30 and 125 pairs. In 1979 the herons moved to a new site outside of the ecological reserve. Shifts in colony location are relatively common in great blue herons. When nesting in the reserve the herons chose a stand of red alders that was protected from the wind by surrounding conifers of taller stature. Nest trees, mostly with one or two nests per tree, were 30 to 60 cm in diameter and most nests were 18 - 21 m above the ground. In view of its location near productive feeding grounds in the Fraser River estuary, the reserve has a high potential for great blue heron nesting and may be used again. Some typical birds of reserve forests are the ruffed grouse, band-tailed pigeon, screech owl, rufous hummingbird, pileated and downy woodpeckers, Steller's jay, chestnut-backed chickadee, red-breasted nuthatch, brown creeper, winter wren, varied and Swainson's thrushes, golden-crowned kinglet, Hutton's vireo, orange-crowned and Wilson's warblers, pine siskin, rufous-sided towhee, and dark-eyed junco.

The mammal fauna is of zoogeographic interest, since the reserve is within the species-rich Puget Sound Lowland, but north of a major barrier (the Fraser River) and now isolated by urban development. Twenty one species of native land mammals are believed to be present in the U.B.C. area as well as 8 species of bats. Species as large as the red fox and black-tailed deer are present. The herpetofauna is also fairly rich for such an isolated area. Three species of salamanders, 3 toads or frogs, 3 snakes and one lizard have been confirmed in the U.B.C. area.

OUTSTANDING FEATURES: The reserve is of great importance as a teaching and research site for U.B.C. staff and students, particularly in the disciplines of forestry, botany, soil science, and ecology.

OTHER INFORMATION: Order-in-Council no. 3828, 19 December 1975. Application no. 234. Map no. 92 G/3; G/6. Access is available along the north boundary (Imperial Road) and south boundary (South West Marine Drive). The area was intermittently logged between 1886 and the late 1920's, and in the 1930's some cordwood cutting, snag felling and trail building occurred. Evidence of skid-trails still exists. Local drainage may have been affected by road construction along parts of the reserve boundary.

Reports are available on the physical and natural resources and vertebrate fauna of the Endowment Lands generally, and on great blue herons in the Lower Mainland, including the former E.R. 74 colony. Research papers on the heron colony have been published. One Ph.D. study in botany has been carried out inside the reserve. Floral and faunal lists are available.

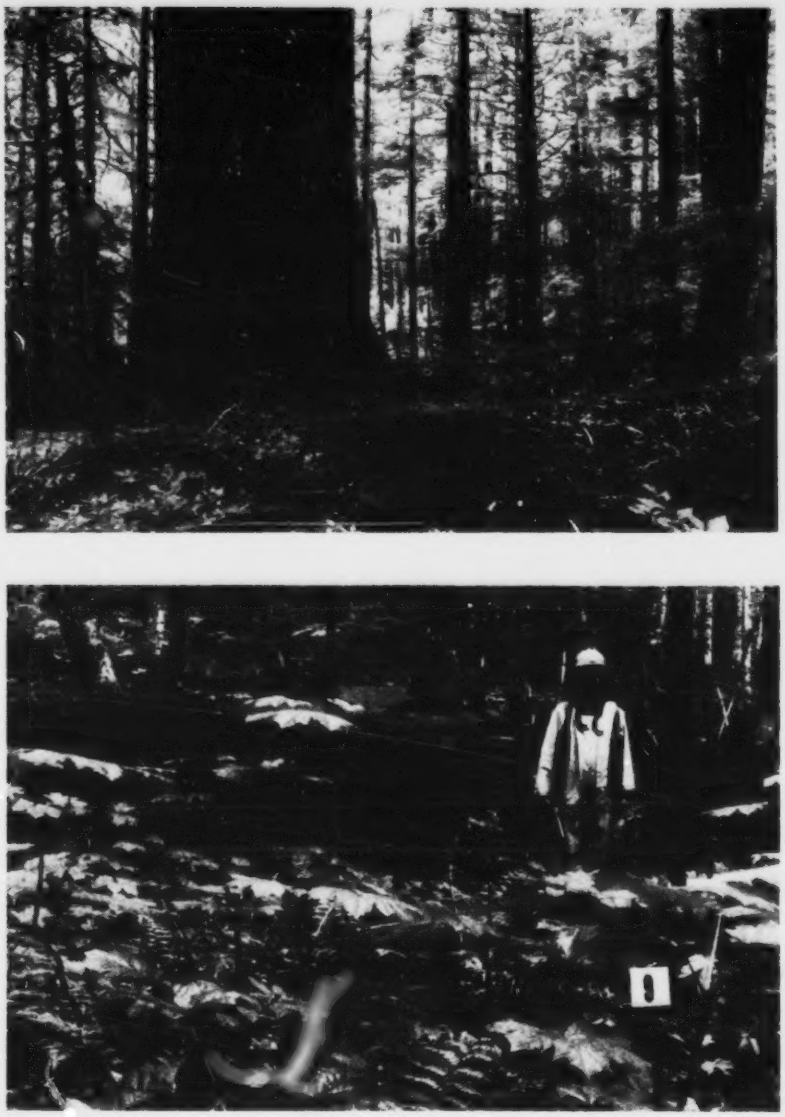


Figure 10. Forestry Research in the Williams Creek Ecological Reserve (#114)

Forestry research is taking place in many ecological reserves and some, such as the Williams Creek Reserve (#114) near Terrace, were created specifically for this purpose. The Williams Creek Reserve, representative of the Coastal Western Hemlock zone, is used by the B.C. Forest Service as a baseline sampling area for ecosystem classification. (Photo J. Pojar)

CLANNINICK CREEK E.R. #75

PURPOSE: To preserve a small, exceptional stand of old-growth Sitka spruce

LOCATION: 3.5 km N of Kyuquot, west coast of Vancouver Island

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SIZE: 37 ha LAT: 50°04'N LONG: 127°23'W ELEVATION: 40 - 45 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

The reserve is situated on the floor of a glaciated creek valley at the western edge of the Vancouver Island Ranges, 2.5 km inland from the Pacific ocean. Adjacent mountains are relatively low (500 - 800 m) and rounded. Regional bedrock consists of Jurassic intrusives and Triassic volcanics. Surficial materials within the reserve are of alluvial origin, and soils developed on them are poorly developed Regosols. Clanninick Creek has a gravel-cobble bottom with occasional large boulders. The reach through the reserve, about 1 km in length, is a single channel of low gradient with little meander, frequent shaded pools, and one low waterfall. The climate is moderate and moist, with annual precipitation of 300 cm, 10% of which falls as snow.

BIOTIC FEATURES:

This reserve features old-growth Sitka spruce trees reaching 2.5 to 3 m in diameter and 75 m in height. There are about 35 such large trees in the reserve, plus smaller ones. Excellent growth is thought to be a result of base-rich parent materials developed from volcanic rocks. Western redcedar, amabilis fir, and red alder also occur. The spruce forest understory is dominated by either an association of sword fern and the moss *Leucolepis menziesii*, or by the moss *Stokesiella praelonga*. Skunk cabbage is common in wet areas. Stands of mixed spruce and western hemlock have an understory dominated by red huckleberry, sword fern, deer fern, and the moss *Isothecium stoloniferum*.

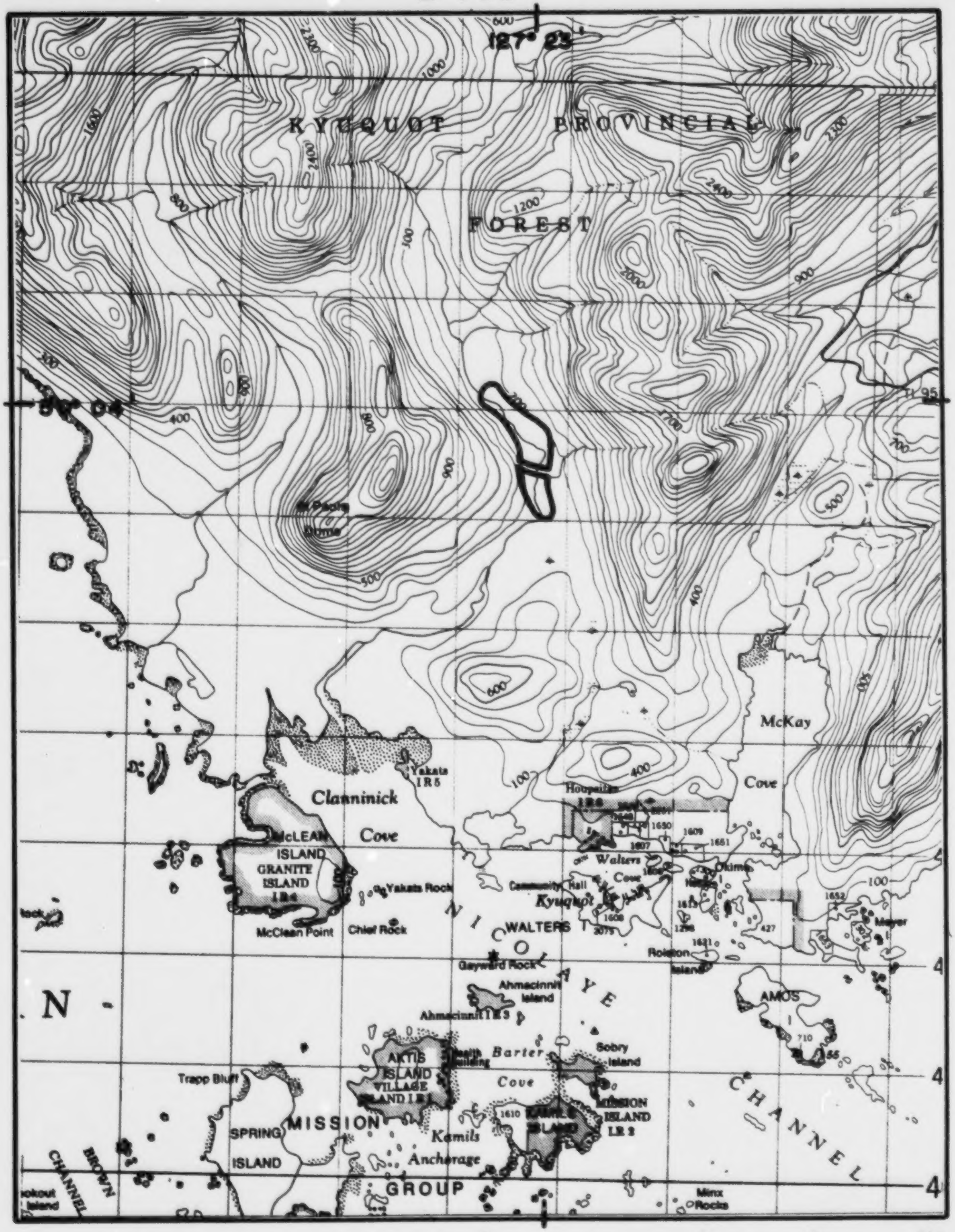
Clanninick Creek provides spawning habitat for small numbers of chinook and pink salmon, significant coho runs (100 - 5000 fish), and major chum escapements (over 25,000 fish). Some spawning occurs in the reach within the reserve.

OUTSTANDING FEATURES: A small but exceptional stand of old-growth Sitka spruce on an alluvial site.

OTHER INFORMATION: Order-in-Council no. 1937, 24 June 1976. Application no. 183. Map no. 92 L/3. Accessible via logging road from vicinity of Kyuquot. One logging road dissects the reserve.

Lands surrounding the reserve have recently been logged, isolating it as a narrow forested island. This has resulted in severe blow-down, making the future value of the reserve uncertain. Further logging in the watershed will probably alter the water quality and flow regime of Clanninick Creek.

2-75B


127° 23'
50° 04'
KYUQUOT PROVINCIAL FOREST
Clanninick Cove
McLEAN ISLAND
GRANITE ISLAND I.R.4
Yakats I.R.5
Yakats Rock
McClean Point
Chief Rock
Houpsitas I.R.6
McKay Cove
Walters Cove
Kyuquot
WALTERS
Community Hall
Rolston Island
Okime
NICOLAYE CHANNEL
Gayward Rock
Ahmacinnit Island
Ahmacinnit I.R.3
AMOS
Mayer
AKTIS ISLAND
VILLAGE ISLAND I.R.1
Health Building
Barter Cove
Sobry Island
MISSION ISLAND I.R.2
KAMILS ISLAND
Kamils Anchorage
Trapp Bluff
SPRING ISLAND
MISSION GROUP
BROWN CHANNEL
Minx Rocks
N

SCALE 1:50000

1 0 1 2 3 4 km

N.T.S. No. 92 L/3

ECOLOGICAL RESERVE No. 75
CLANNINICK CREEK

FRASER RIVER

E.R. #76

PURPOSE: Conservation of the only remaining unaltered and uncommitted lower Fraser River floodplain islands

LOCATION: 6 km W of Chilliwack

SIZE: 76 ha LAT: 49°10'N LONG: 122°02'W ELEVATION: 10 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

The reserve is located in a reach of the Fraser having many islands and bars. Much sand and gravel is deposited in this low-gradient stretch of the river. The river is from 1.3 to 2.0 km wide in this area, and has mean monthly flows varying from about 1500 to 9,000 m^3/s. Peak flow is in July, lowest flows are in winter. Seasonal variations in flow result in much reworking of sediments, shifting of bars, and erosion and accretion of islands. The reserve consists primarily of two vegetated islands in close proximity. The islands are low-lying, flat-surfaced, and have good mositure availability.

BIOTIC FEATURES:

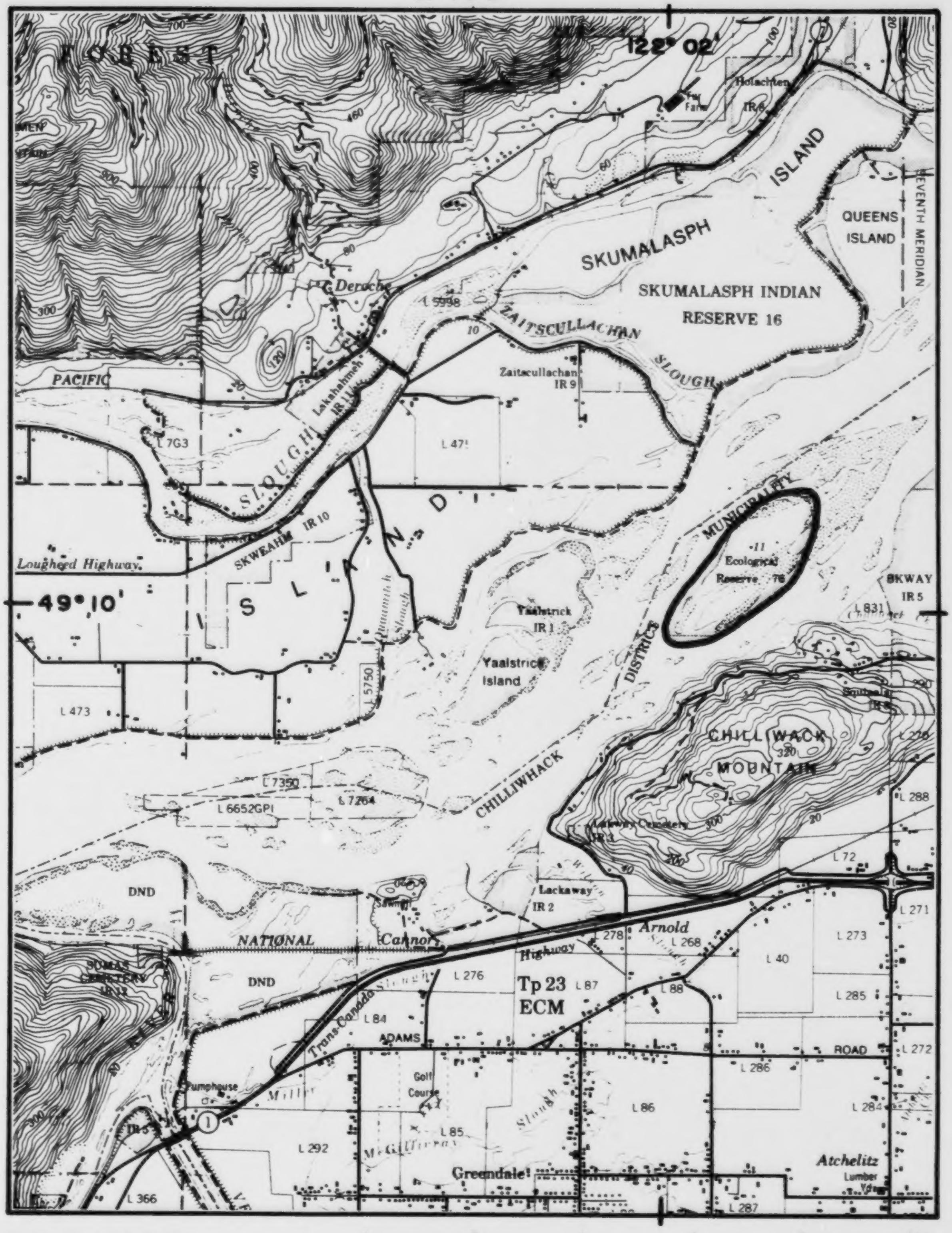
The plant communities are primarily made up of seral species able to colonize new alluvial substrates and tolerant of periodic flooding. Horsetails (Equisetum spp.), willows (Salix spp.) and black cottonwood are the most characteristic such plants. In typical situations a band of scouring-rush occurs at the outer edge of the islands in situations prone to flooding and silt or sand deposition. The next community inward is usually dominated by willows, typically Sitka willow, but also Pacific, soft-leaved and Mackenzie's willows, together with horsetails and bentgrass. Pacific ninebark may also occur with the willow. The most stable and extensive community is that dominated by black cottonwood. Abundant understory shrubs are red-osier dogwood, salmonberry, thimbleberry, and common snowberry. Other trees recorded in the reserve include vine maple, bigleaf maple, red alder, paper birch, flowering dogwood, Douglas fir, western redcedar, and western hemlock.

Three beaver houses are present, although probably not all occupied. Due to fluctuating river levels and strong currents there are few suitable sites for establishment of beaver houses. Deer mice, coyotes, and black-tailed deer are present. Birds recorded here include ruffed grouse, downy woodpeckers, bald eagles, and red-tailed hawks. An active red-tailed hawk nest has been noted. Pink salmon spawn along island shorelines.

OUTSTANDING FEATURES: The reserve supports the last remaining undisturbed and uncommitted deciduous alluvial forest along the lower Fraser River.

OTHER INFORMATION: Order-in-Council no. 660, 24 February 1977. Application no. 186. Map no. 92 G/1. Access by boat. One report is available on beaver occurrence.

2-76 B



122° 02'
49° 10'
FOREST
SKUMALASPH ISLAND
SKUMALASPH INDIAN RESERVE 16
QUEENS ISLAND
SEVENTH MERIDIAN
ZAITSCULLACHAN SLOUGH
Zaitscullachan IR 9
Deroche
Holachten IR 8
Fur Farm
L 5998
PACIFIC
Lakahahmen IR 11
SLOUGH
L 763
L 471
SKWEAHM IR 10
Lougheed Highway
ISLAND
MUNICIPALITY
DISTRICT
CHILLIWHACK
Ecological Reserve 76
SKWAY IR 5
L 831
Yaalstrick IR 1
Yaalstrick Island
L 473
L 5750
CHILLIWACK MOUNTAIN
L 7350
L 6652GPI
L 7264
Lackaway Cemetery IR 3
Lackaway IR 2
DND
NATIONAL
Cannor
Sewage
Arnold Slough
Highway
Trans-Canada
L 276
L 278
L 268
Tp 23 ECM
L 87
L 88
L 84
ADAMS ROAD
Golf Course
L 86
L 85
L 292
L 366
Greendale
Atchelitz
Lumber Yd
L 287
L 72
L 271
L 273
L 40
L 285
L 272
L 286
L 284
L 288
L 270
SUMAS CEMETERY IR 12
Pumphouse
IR 5
1

SCALE 1:50000

1 0 1 2 3 4 km

N.T.S. No. 92 G/1

ECOLOGICAL RESERVE No. 76
FRASER RIVER

CAMPBELL-BROWN (KALAMALKA LAKE) E.R. #77

PURPOSE: Preservation of ecosystems transitional between Ponderosa Pine and Interior Douglas Fir, and a rattlesnake den

LOCATION: 5 km N of Oyama, W side Kalamalka Lake

SIZE: 107 ha LAT: 50°09'N LONG: 119°22'W ELEVATION: 425 - 775 m

BIOGEOCLIMATIC ZONES: Ponderosa Pine; Interior Douglas Fir

PHYSICAL FEATURES:

The reserve is situated on the relatively steep eastern slope of Ellison Ridge, facing Kalamalka Lake. Bedrock outcrops, small cliffs and talus slopes are scattered through the area. Soils vary from Chernozems in grassy openings to Regosols on colluvial sites. There are no streams, but at least one spring is present. Climate is expected to be similar to that at Vernon where mean annual precipitation is about 40 cm.

BIOTIC FEATURES:

The most extensive plant community is dominated by ponderosa pine, the grasses blue-bunch wheatgrass and Idaho fescue, and the moss *Tortula ruralis*. Small amounts of Douglas fir are present, but the shrub stratum is sparse. At higher elevations the Douglas fir - common snowberry type, in which wild and baldhip rose, birch-leaved spirea, and showy aster are also characteristic, is fairly widespread.

A winter den (hibernaculum) of the Pacific rattlesnake (*Crotalus viridus*), used by about 100 snakes, is located in a large earth-covered mound of broken rock. Most snakes emerge in April and return to the den in September. Maximum dispersal from the den is less than 2 km, and most home ranges are a few hectares in size. These snakes prey almost entirely on small mammals, of which voles and deer mice are most prominent in the diet. These rattlesnakes, near the northern limit of the species range, have a low reproductive rate and are therefore easily reduced by man-caused mortality.

Birds have not been thoroughly inventoried but typical dry-forest species like Lewis' woodpecker, common flicker, chickadees and juncos are present. The reserve provides excellent winter range for mule deer.

OUTSTANDING FEATURES: Rattlesnake hibernaculum

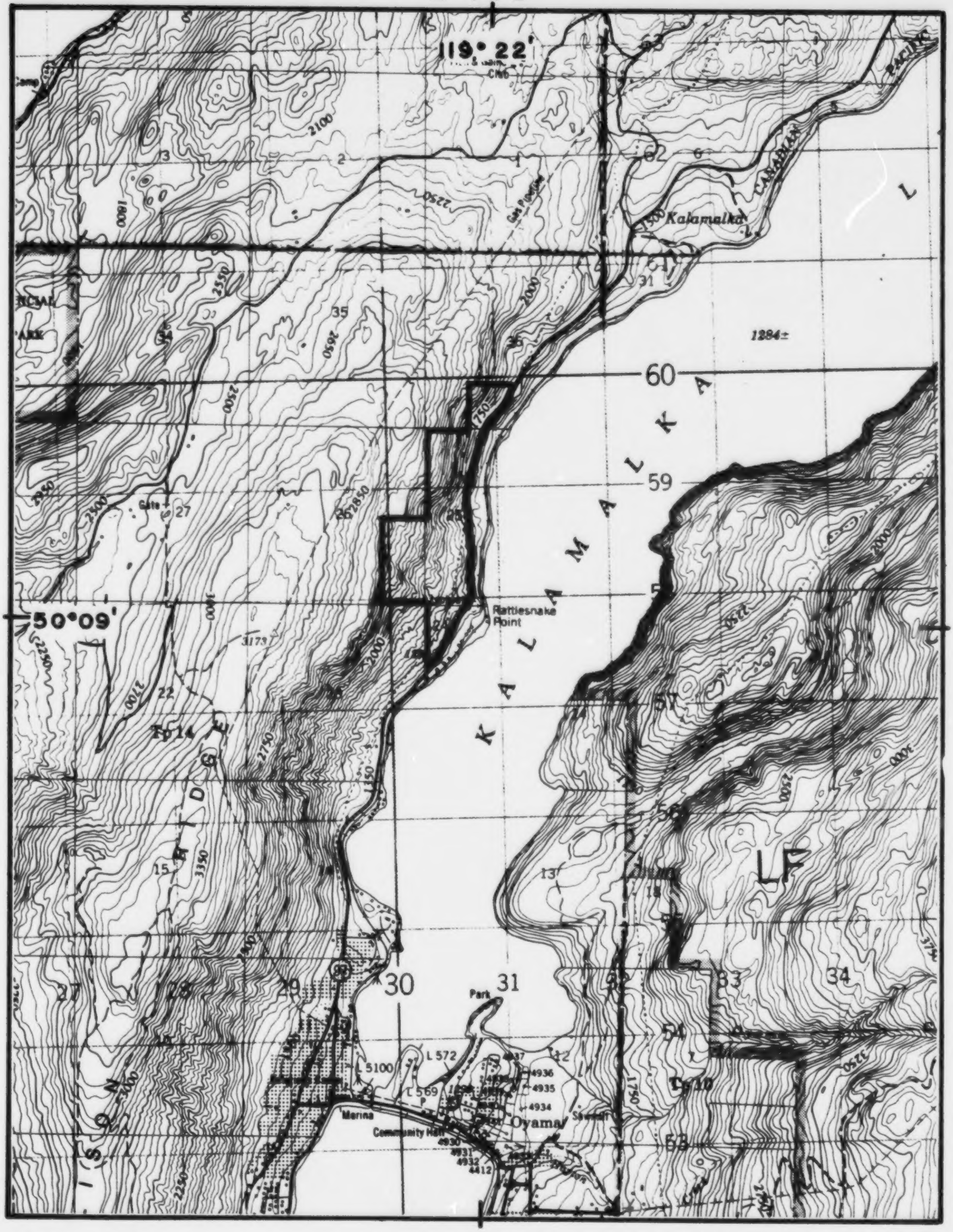
OTHER INFORMATION: Order-in-Council no. 1816, 9 June 1977, no. 575, 19 March 1986 (powerline deletion), and no. 400, 26 February 1986 (highway deletion). Application no. 251. Map no. 82 L/3.

Highway 97 borders the reserve on the east, and a powerline right-of-way passes through it. Light grazing, selective logging and 4-wheel drive tracks have caused minimal disturbance. Most of the area is fenced.

A graduate thesis on rattlesnakes in the Vernon area includes data on the E.R. 77 den.

This is the first ecological reserve in the province to be established on donated land. The land was provided by Dr. Hugh Campbell-Brown.

2-77B


119° 22'
50°09'
Club
Kalamalka
CANADIAN PACIFIC
Gas Pipeline
Gate
K A L A M A L K A
L
1284±
Rattlesnake Point
R I D G E
Tp 14
Tp 10
LF
Park
Marina
Community Hall
Oyama
Sawmill
60
59
57
56
54
53
30
31
33
34
27
28
29
35
36
26
25
22
15
13
18
2100
2250
2500
2850
3000
3173
3350
750
2000
1750

SCALE 1:50000

1 0 1 2 3 4km

N.T.S.No. 82 L/3

CAMPBELL-BROWN ECOLOGICAL RESERVE
No. 77 (KALAMALKA LAKE)

MERIDIAN ROAD (VANDERHOOF)

E.R. #78

PURPOSE: To retain a sample of mature Engelmann spruce - subalpine fir forest representative of uplands within the Nechako Plateau

LOCATION: 40 km S of Vanderhoof

SIZE: 262 ha LAT: 53°39'N LONG: 124°01'W ELEVATION: 1190 - 1240 m

BIOGEOCLIMATIC ZONE: Engelmann Spruce - Subalpine Fir

PHYSICAL FEATURES:

Located at the eastern edge of the Nulki Hills, a rolling upland within the Nechako Plateau, this reserve has little topographic variation. Surface slope, almost imperceptible, is to the east. Meandering un-named streams which flow across the reserve have formed shallow valleys. These drain into the Chilako River. Except in a few sedge meadows and bogs, soils are predominantly Podzols, developed on glacial till.

BIOTIC FEATURES:

This reserve is almost entirely covered with dense stands of mature conifers; boggy sites, mostly in the northern corner, comprise less than 5% of its total area. The forest communities are characteristic of lower elevations in the Engelmann Spruce - Subalpine Fir Zone, near its contact with the Sub-Boreal Spruce Zone. Three species of spruce (Engelmann; white; black) as well as spruce hybrids are present, and one or more species is prominent in all of the four communities that have been described here. Subalpine fir and lodgepole pine also occur.

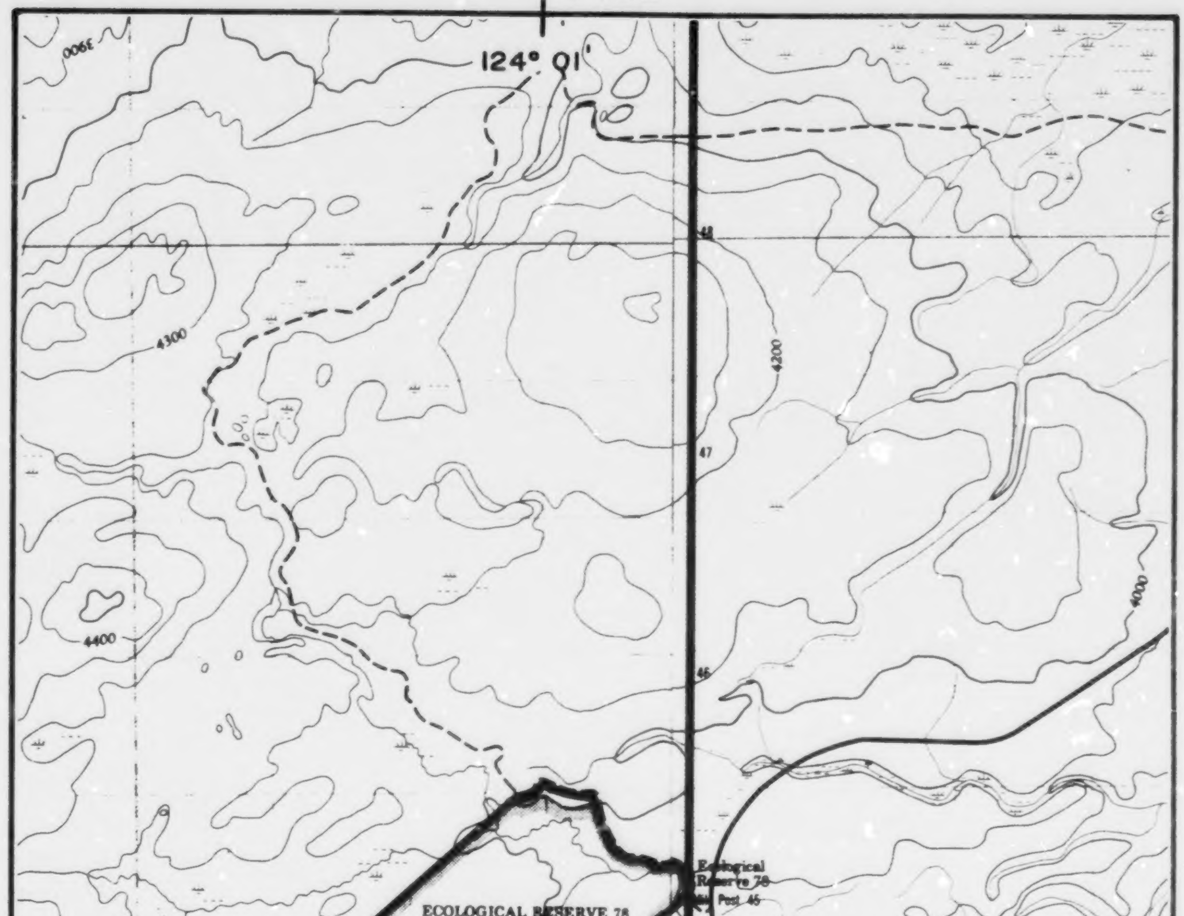
Stands of predominantly Engelmann and white spruce, with an understory dominated by white rhododendron, five-leaved bramble, and moss, cover extensive areas. Two upland communities contain mixed stands of spruce and subalpine fir. One of these is characterized by false azalea, black huckleberry, five-leaved bramble and mosses, the other by sweet colt's-foot, oak fern, and moss. Black spruce - lodgepole pine bogs occupy small areas, and have an understory in which Labrador tea, sphagnum and other moisture-loving mosses, and cup lichens are prominent. Sedge meadows are also evident on aerial photos.

The fauna has not been surveyed, but is expected to be fairly limited due to lack of habitat diversity. This is excellent habitat however for those species adapted to mature coniferous forests.

OTHER INFORMATION: Order-in-Council no. 3772, 15 December 1977. Application no. 208. Map no. 93 F/9; G/12. Access via rough logging roads from Vanderhoof. One such road, the Meridian Road, marks the northeast boundary of the reserve.

Forests of commercial value surround much of the reserve, which may eventually become an isolated stand of mature timber. It is large enough however that adjacent logging should have negligible impact on its integrity.

2-78B


124° 01'
53° 39'
3900
4300
4400
4200
4000
4000
3800
3500
3750
△ 3763
48
47
46
44
ECOLOGICAL RESERVE 78
Ecological Reserve 78
Post 45
LAND DISTRICT
30
31
32
33
34
35
36
37
1
0
1
2
3
4 km

SCALE 1:50000

N.T.S. No. 93 F/9,
93 G/12

ECOLOGICAL RESERVE No. 78
MERIDIAN ROAD

CHILAKO RIVER E.R. #79

PURPOSE: To protect the most southerly known stand of tamarack trees in British Columbia

LOCATION: 54 km S of Vanderhoof; 2 km N of Chilako River

SIZE: 64 ha LAT: 53°33'N LONG: 123°58'W ELEVATION: 900 - 915 m

BIOGEOCLIMATIC ZONE: Sub-boreal Spruce

PHYSICAL FEATURES:

The reserve lies on the gently rolling surface of the Nechako Plateau and has little variation in relief. A shallow east-west depression across the reserve is occupied by a minor water course which drains wetlands located on the east. This flows westward to join other creeks which enter the Chilako River. Drumlins and flutings indicate that Pleistocene ice moved northeastward in this area. The variable local soils are developed on glacial till. The climate is expected to be slightly cooler than Vanderhoof, which is 300 m lower in elevation. Mean annual precipitation there is 46 cm (40% as snow); mean monthly January and July temperatures are -12°C and 15°C respectively.

BIOTIC FEATURES:

The major feature of this reserve is a stand of vigorous tamarack trees located well to the south of the usual range of this species in the Boreal White and Black Spruce Zone of the Peace River - Fort Nelson - Liard area. Black spruce is also near the southern limit of its range here. The reserve is largely forested, but contains small, scattered sedge meadows.

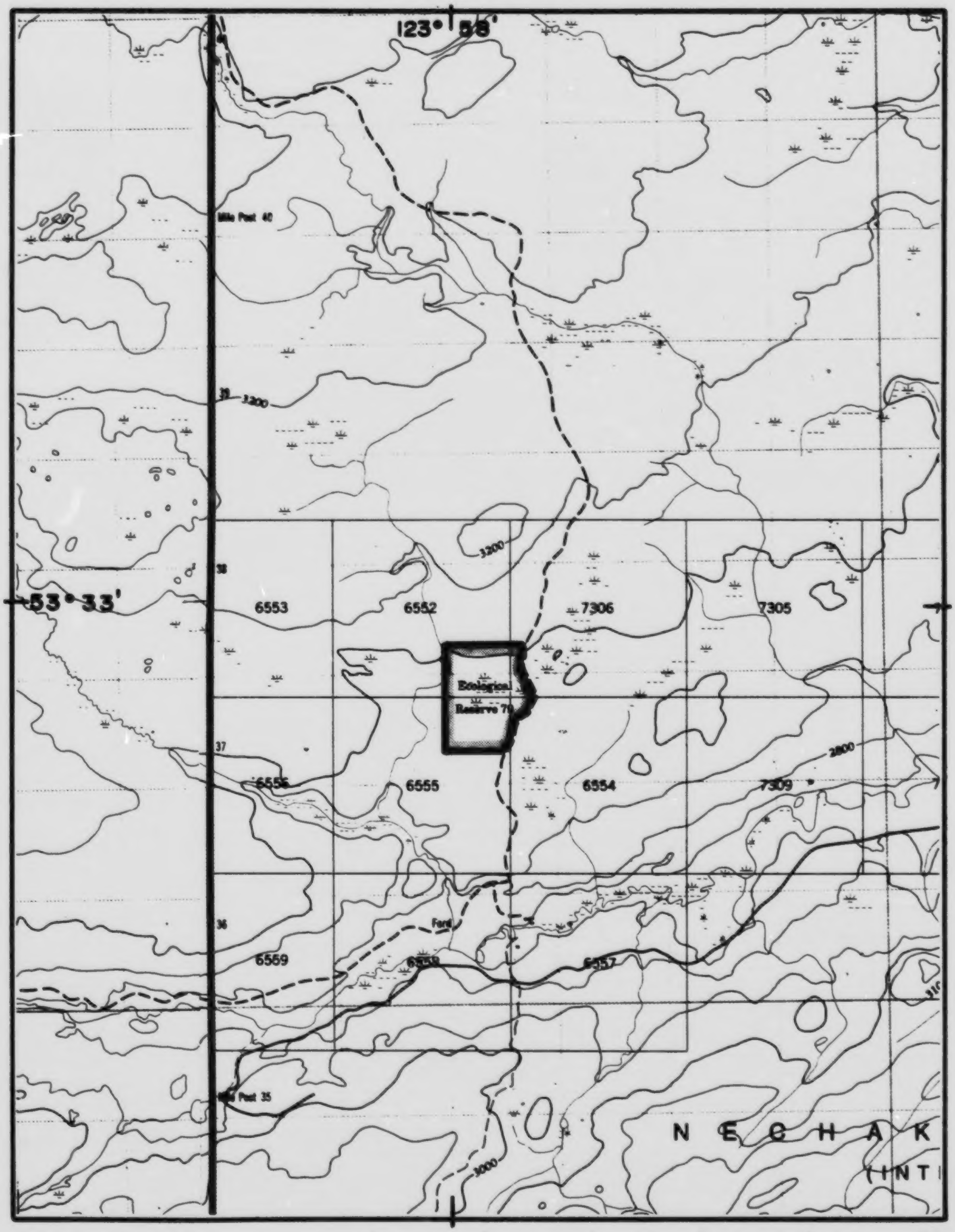
Three forest communites have been described here. Sites dominated by tamarack are swampy and the ground cover is characterized by sphagnum mosses and other moisture-loving bryophytes. Mixed black spruce - tamarack stands, in which shrubs such as Labrador tea and scrub birch are common, also occur. Many trees in these stands are festooned with black arboreal lichens. Drier locations in the reserve support spruce - lodgepole pine forest, with ground cover dominated by mosses and lichens. Other upland species include trembling aspen, common juniper, prickly rose, Bebb's willow and soopolallie.

The fauna has not been surveyed.

OUTSTANDING FEATURES: The most southerly known stand of tamarack in British Columbia.

OTHER INFORMATION: Order-in-Council no. 3773, 15 December 1977. Application no. 209. Map no. 93 G/12. Access via logging roads south from Vanderhoof. A road follows the east boundary of the reserve.

2-79 B


123° 58'
Mile Post 40
39
3200
38
53° 33'
6553
6552
7306
7305
Ecological Reserve 79
3200
37
6556
6555
6554
2800
7309
36
Ford
6569
6558
6557
Mile Post 35
3000
N E C H A K
(INT

SCALE 1·50 000

1 0 1 2 3 4 km

N.T.S. No. 93 F/9,
93 G/12

ECOLOGICAL RESERVE No. 79
CHILAKO RIVER

SMITH RIVER

E.R. #80

PURPOSE: To establish a research area containing unburned forest ecosystems representative of the Boreal White and Black Spruce Zone

LOCATION: W side of Smith River, 115 km ESE of Lower Post

SIZE: 1,326 ha LAT: 59°41'N LONG: 126°30'W ELEVATION: 580 - 1295 m

BIOGEOCLIMATIC ZONES: Boreal White and Black Spruce; Spruce - Willow - Birch

PHYSICAL FEATURES:

The reserve encloses an entire drainage basin on the east slope of an upland within the Liard Plain. This upland has rounded summits which were over-ridden and smoothed by Pleistocene ice, and slopes which have subsequently been dissected by stream erosion. The un-named creek in the reserve flows eastward into the Smith River which empties into the Liard. Most of the area is driff-covered; bedrock exposures are rare. Soils are only moderately weathered and largely classified as Brunisols.

BIOTIC FEATURES:

Except for a few steep slopes and ridge-crests the entire reserve is forested with mature stands. The reserve watershed has escaped the widespread fires which have burned much of this part of the province in the past 50 years. Most of the reserve area falls within the Boreal White and Black Spruce Zone. Based on air photo interpretation, its highest reaches may be representative of the Spruce - Willow - Birch Zone, but the high-elevation vegetation has not been examined in the field.

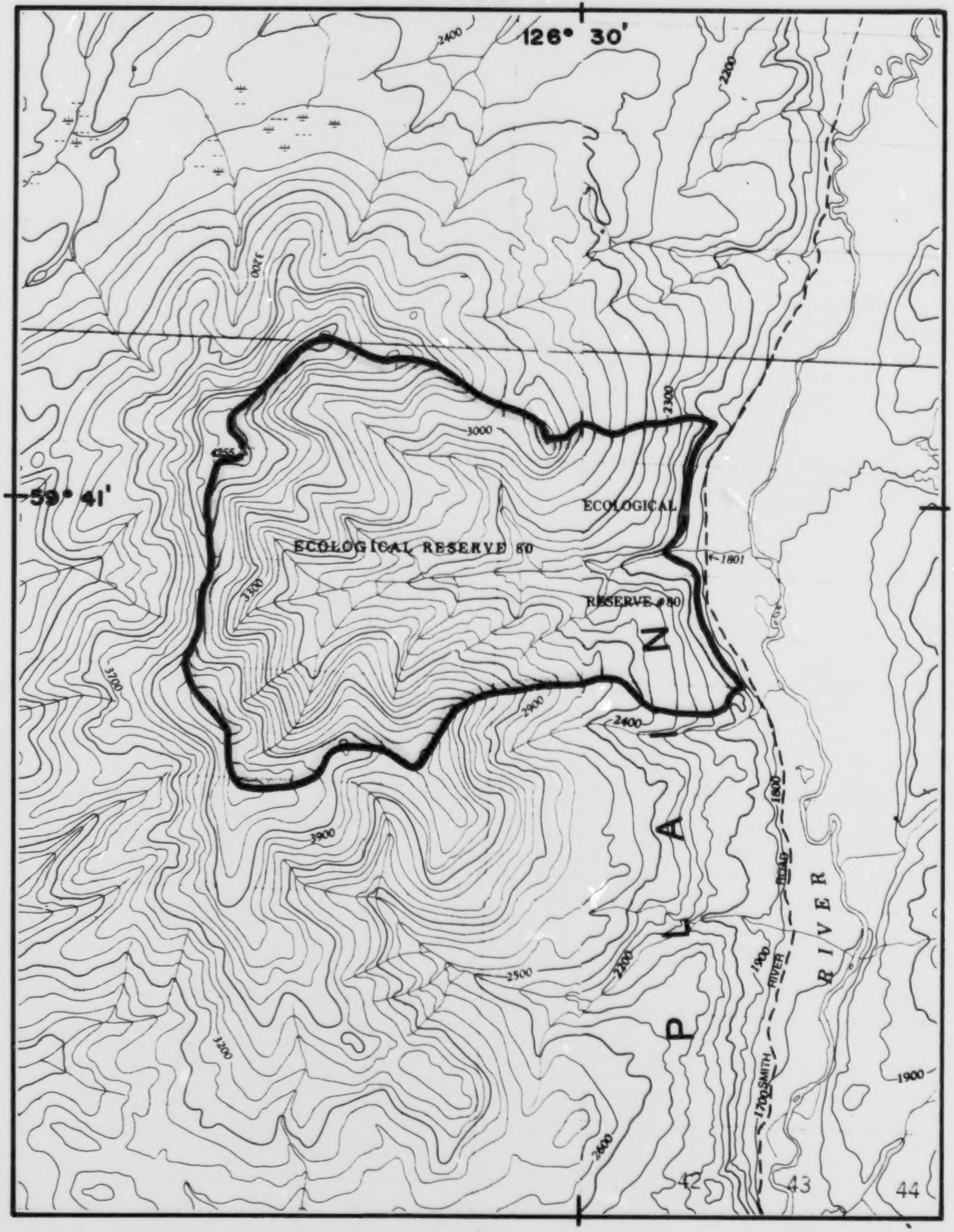
Four communities have been described at lower and middle elevations, two of which are dominated by white spruce. One white spruce type is characterized by an understory of highbush-cranberry, prickly rose, red-osier dogwood, wild sarsaparilla, and meadow horsetail; the other contains tamarack trees and is distinguished by Bebb's willow, Labrador tea, common and meadow horsetail, and knight's plume moss. Black spruce woods in which bilberry willow and mosses are dominant in the understory also occur.

At middle elevations, especially on dry south-facing slopes, lodgepole pine is the dominant tree. Pine stands have an understory charactertized by soopolallie, prickly rose, common juniper, kinnikinnick, mountain death-camas, and wheat grass. The delicate fairy-slipper orchid is relatively common in mossy spruce woods.

Birds noted here include the dark-eyed junco, evening grosbeak, yellow-rumped warbler, boreal chickadee, ruby-crowned kinglet, golden-crowned kinglet, and spruce grouse.

OUTSTANDING FEATURES: An entire watershed containing unburned forests accessible by road in the Boreal White and Black Spruce Zone.

OTHER INFORMATION: Order-in-Council no. 3774, 15 December 1977. Application no. 231. Map no. 94 M/9; M/10. Vehicular access to the lower boundary of the reserve possible in summer on the Smith River forestry road.


126° 30'
59° 41'
2400
2200
3300
2300
3000
4255
ECOLOGICAL RESERVE 80
ECOLOGICAL
RESERVE #80
1801
3300
3700
2900
2400
3900
1800
PLAIN
SMITH RIVER
RIVER
1900
2500
2200
3200
1700 SMITH
1900
2600
42
43
44
SCALE 1:50000
1 0 1 2 3 4km

N.T.S.No. 94 M/9,10

ECOLOGICAL RESERVE No. 80
SMITH RIVER

MORICE RIVER E.R. #81

PURPOSE: Preservation, for research purposes, of forest ecosystems representative of the western edge of the Sub-boreal Spruce Zone

LOCATION: W side of Morice River, 24 km SW of Houston

SIZE: 358 ha LAT: 54°14'N LONG: 126°52'W ELEVATION: 640 - 800 m

BIOGEOCLIMATIC ZONE: Sub-boreal Spruce

PHYSICAL FEATURES:

The reserve is situated in an area of irregular topography near the western edge of the Nechako plateau. Just beyond, to the northeast, are the Bulkley Ranges. The plateau surface in the reserve is at about the 800 m level. The western half of the reserve, on the plateau surface, is quite flat. To the east, the reserve slopes strongly toward the Morice River, which forms its eastern boundary. The river here has a well entrenched single channel, fairly rapid flow, and very little active floodplain development. Soils are mostly Gray Luvisols and Brunisols.

BIOTIC FEATURES:

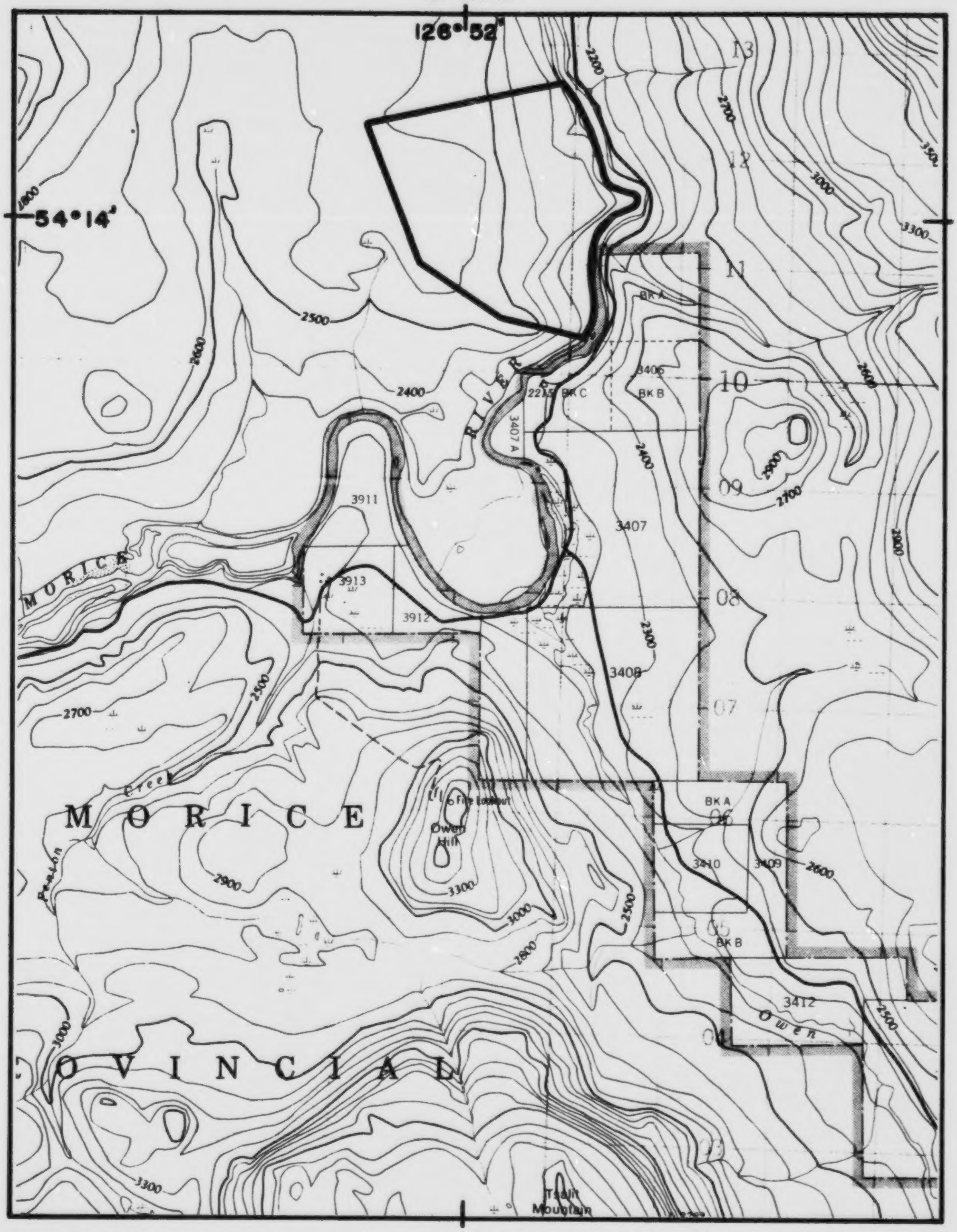
Vegetation in the reserve was incompletely described prior to a forest fire which burned almost its entire area in May 1983. However, trees known to be present include Engelmann and white spruce hybrids, black spruce, subalpine fir, lodgepole pine, paper birch, trembling aspen, and black cottonwood. Aerial photos indicate that most of the flatter uplands supported dense stands of lodgepole pine or spruce, more open woods containing aspen occurred on southeast-facing slopes near the river, and a few cottonwoods were present along the riverbank.

Slopes near the river provide important range for moose and mule deer.

OTHER INFORMATION: Order-in-Council no. 3775, 15 December 1977. Application no. 204. Map no. 93 L/2. Access is possible via the Morice River Road, south from Highway 15 near Houston, and a temporary logging bridge across the Morice River.

Forest regeneration following fire is being studied here by the Research Branch, British Columbia Ministry of Forests and Lands.

2-81B



126° 52'
54° 14'
MORICE
RIVER
MORICE
OVINCIAL
Creek
Owen
Owen Hill
Fire Lookout
Tsalit Mountain
3911
3912
3913
3407
3407 A
3406
3408
3409
3410
3412
2213
BK A
BK B
BK C
2200
2300
2400
2500
2600
2700
2800
2900
3000
3300

SCALE 1:50000

1 0 1 2 3 4km

N.T.S. No. 93 L/2

ECOLOGICAL RESERVE No. 81
MORICE RIVER

CINEMA BOG E.R. #82

PURPOSE: To protect accessible diverse bog habitats containing many plants at or near their southern limit of distribution

LOCATION: Beside Highway 97, 28 km NNE of Quesnel

SIZE: 68 ha LAT: 53°15'N LONG: 122°26'W ELEVATION: 670 m

BIOGEOCLIMATIC ZONE: Sub-boreal Spruce

PHYSICAL FEATURES:

The reserve occupies the level bottom of a shallow north-south trough which was probably an ancient meltwater channel. This trough is within the Fraser Basin, a drift-covered area of low relief lying below the general surface of the Interior Plateau. Boggy ground in and adjacent to the reserve has no organized drainage patterns. Soils are predominantly organic in nature. Based on data for nearby Quesnel, the climate is characterized by mean daily July and January temperatures of 17°C and -10°C respectively, and total annual precipitation of 51 cm, 30% of which falls as snow.

BIOTIC FEATURES:

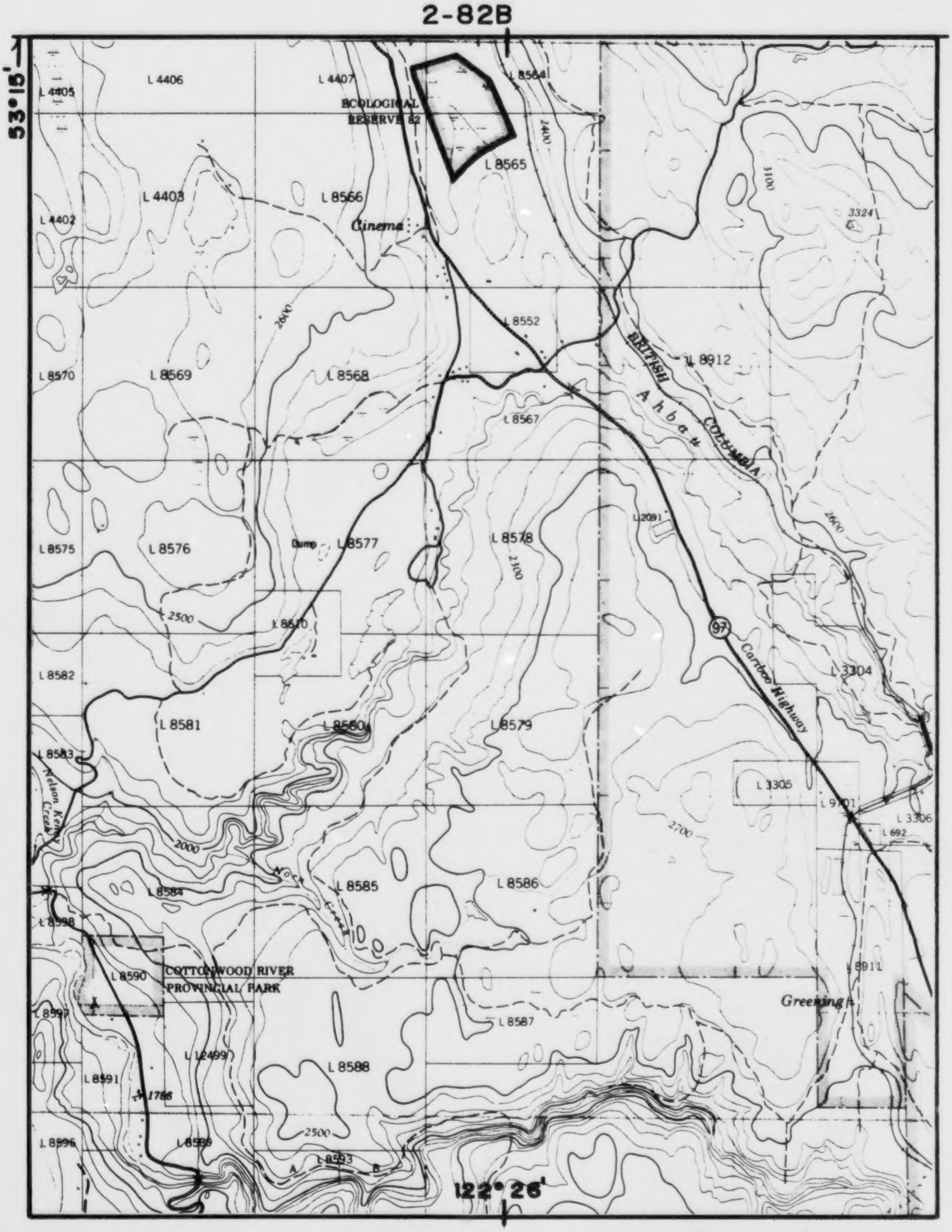
The reserve consists of treeless bogland surrounded by bog forest which is dominated by black spruce. On the highest sites the black spruce stands have an understory dominated by bog rosemary, Labrador tea, and sphagnum moss; on wetter areas scrub birch, water sedge, lesser panicled sedge and mosses predominate and spruce trees are more scattered. A few thickets made up of mountain alder and willows, with ostrich fern in the understory, occur at the forest margin.

Treeless boglands have shrub cover dominated by Labrador tea, scrub birch, or bog rosemary, and sphagnum moss covering the ground. Cotton-grasses, sedges, and bog cranberry are also characteristic, and northern bog plants such as cloudberry, long-leaved sundew and round-leaved sundew are present. Fen-like tussock swamps are dominated by Hudson Bay and tufted deer-grass and scheuchzeria; bog pools often contain buckbean. An exceptional diversity of sedges (11 species) has been noted, as well as several species of mosses and lichens.

The fauna has not been surveyed but sign of moose and black bears is abundant.

OUTSTANDING FEATURES: An excellent and accessible example of northern sphagnum bog, near the southern limit of distribution of this vegetation type, and containing a mosaic of low and high bog (moor) communities.

OTHER INFORMATION: Order-in-Council no. 3878, 22 December 1977. Application no. 224. Map no. 93 G/1. Accessible from Highway 97, 0.5 km north of Cinema. Surrounding areas have been disturbed by highway and railroad construction, land clearing and logging. The bog is intact but could be affected by drainage of adjacent wetlands, if attempted.



2-82B
53°15'
122°26'
ECOLOGICAL RESERVE 82
Cinema
Dump
Cariboo Highway
97
BRITISH COLUMBIA
Ahbau
Nelson Kenny Creek
COTTONWOOD RIVER PROVINCIAL PARK
Greening
L 4405
L 4406
L 4407
L 8564
L 8565
L 4403
L 8566
L 4402
L 8552
L 8912
L 8570
L 8569
L 8568
L 8567
L 2091
L 8575
L 8576
L 8577
L 8578
L 8580
L 8582
L 3304
L 8581
L 8560
L 8579
L 8583
L 3305
L 9701
L 3306
L 692
L 8584
L 8585
L 8586
L 8598
L 8590
L 8911
L 8597
L 8587
L 12499
L 8588
L 8591
1786
L 8596
L 8593
A
B
2400
3100
3324
2600
2100
2500
2000
2700

SCALE 1:50000

1 0 1 2 3 4km

N.T.S. No. 93 G/1

ECOLOGICAL RESERVE No. 82
CINEMA BOG

SAN JUAN RIDGE

E.R. #83

PURPOSE: To protect a rare and disjunct population of the white glacier lily, sub-alpine mountain hemlock vegetation, and subalpine wetlands

LOCATION: 22 km E of Port Renfrew, southwestern Vancouver Island

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SIZE: 98 ha LAT: 48°32'N LONG: 124°06'W ELEVATION: 860 - 1040 m

BIOGEOCLIMATIC ZONE: Mountain Hemlock

PHYSICAL FEATURES:

San Juan Ridge is the remnant of a Tertiary erosion surface, subsequently over-ridden and smoothed by Pleistocene ice which moved southerly across it. The reserve slopes to the north from its southern boundary which follows the crest of San Juan Ridge. Most of the reserve is gently rolling to dissected, but steep slopes occur along both sides of its northern bulge. Drainage is primarily into Three Arm Creek, a tributary of San Juan River. Proximity to the outer coast (10 km) and relatively high elevation result in deep persistent snow cover in at least some years.

BIOTIC FEATURES:

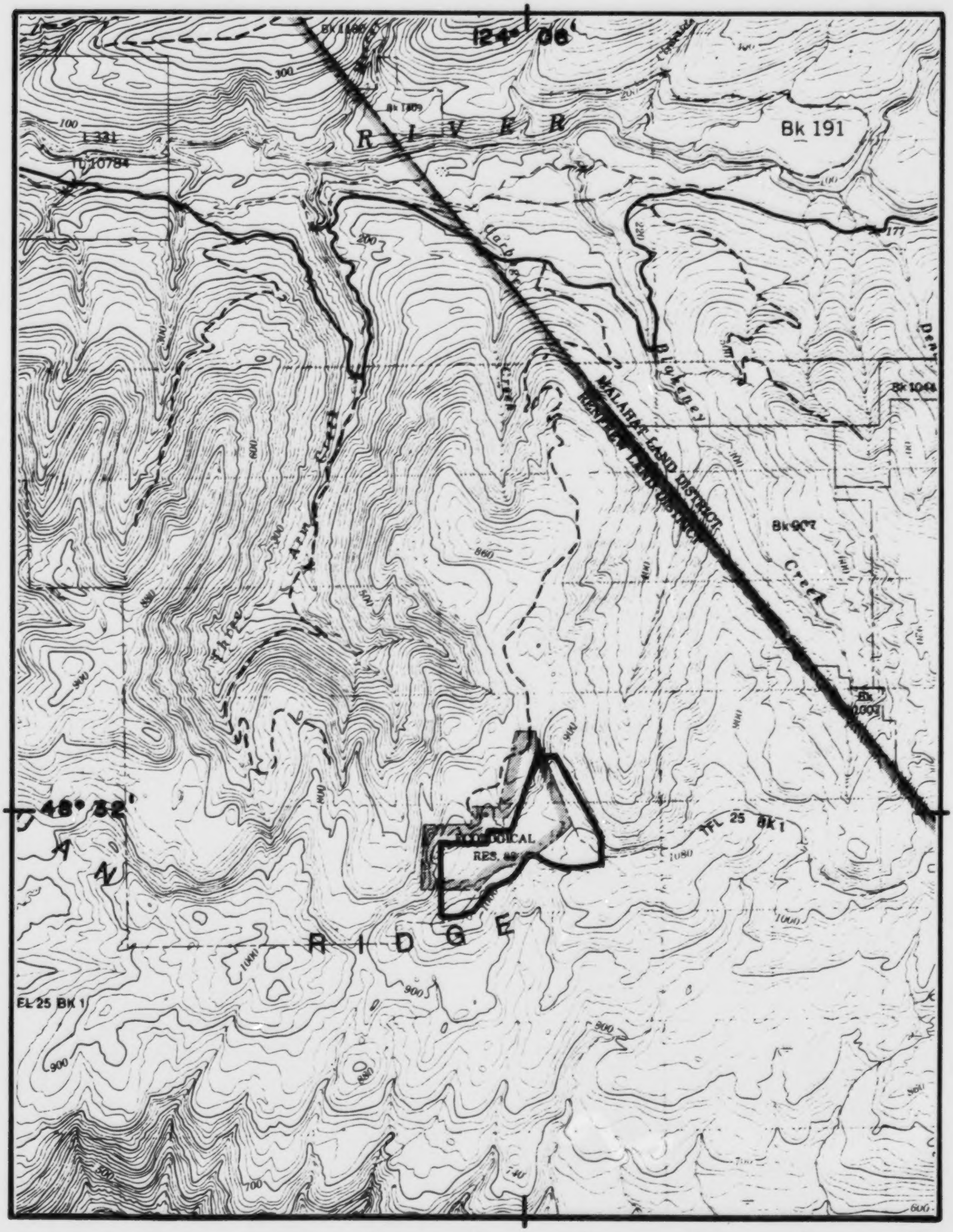
Northerly aspect, ridgetop winds, and deep snowfall result in the occurrence of sub-alpine (and even alpine-like) vegetation at fairly low elevations. This provides suitable habitat for the white glacier lily, Erythronium montanum, known to occur in British Columbia only here, at Tahsis, and Mount Waddington. This species, which blooms here in June, has a most distinctive leaf with its broad glossy green blade, abruptly narrowed base, and long slender petiole. It is most abundant in forest openings where snow persists until late in spring. Other "snowbed" plants here are black alpine sedge and the lichen Siphula ceratites.

Forest types here include limited mountain hemlock - amabilis fir stands with an understory containing small twistedstalk, more extensive and more open yellow cedar - mountain hemlock woods with an understory of Alaskan blueberry and copperbush, stunted stands of mountain hemlock, and boggy areas dominated by yellow cedar and skunk cabbage. Localized openings dominated by red and white mountain-heather also occur. Wetlands and ponds provide habitat for cotton-grass, white marsh-marigold, butterwort, deer-cabbage, great burnet, tufted deer-grass, spreading rush, and narrow-leaved bur-reed.

The vertebrate fauna has not been described.

OUTSTANDING FEATURES: Excellent and relatively accessible population of the rare white glacier lily.

OTHER INFORMATION: Order-in-Council no. 3879, 22 December 1977. Application no. 178. Map no. 92 C/9. The reserve is in a completely natural state, although logging occurs near its northern boundary. There is logging road access to within a few hundred meters of the boundary.


124° 06'
48° 32'
R I V E R
Bk 191
Bk 907
Bk 1041
Bk 1007
L 331
TL 10784
MALAHAT LAND DISTRICT
RENFREW LAND DISTRICT
Blakeney
Creek
Clark
Three
Arm
Creek
ECOLOGICAL
RES. 83
TFL 25 BK 1
TFL 25 BK 1
S A N
R I D G E
1080
1000
900
860
800
700
600
500
300
200
100

SCALE 1:50000

1 0 1 2 3 4 km

N.T.S. No. 92 C/9

ECOLOGICAL RESERVE No. 83
SAN JUAN RIDGE

ALEZA LAKE E.R. #84

PURPOSE: Protection for research purposes of forests representative of a cool wet region within the Sub-boreal Spruce Zone

LOCATION: 50 km NE of Prince George; 4 km SW of Aleza Lake

SIZE: 242 ha LAT: 54°05'N LONG: 122°06'W ELEVATION: 630 - 700 m

BIOGEOCLIMATIC ZONE: Sub-boreal Spruce

PHYSICAL FEATURES:

The reserve lies on a gently dissected plain of low relief between the Fraser and Bowron Rivers. This area was flooded by a glacial lake at the close of the ice age and is underlain by glacial lake clays. The reserve has a very gentle slope to the north, and small streams flowing northward in shallow valleys have their headwaters in the reserve. A shallow lake, about 12 ha in size, is located near the south boundary. Local climate is characterized by mean daily July and January temperatures of 15°C and -12°C respectively, and total precipitation of 93 cm, 40% of which falls as snow.

BIOTIC FEATURES:

Except for the lake and a few small bogs the reserve is entirely forested. A variety of tree species is present but stands tend to be dominated by white spruce. Pure stands of white spruce have an understory characterized by black huckleberry, queen's cup, and mosses (knight's plume and red-stemmed feather moss). Dry sites support mixed stands of spruce, lodgepole pine, Douglas fir and trembling aspen in which prince's pine, rattlesnake-plantain and mosses are typical associates. In more moist locations, subalpine fir is co-dominant with white spruce and the understory may be dominated by oak fern and knight's plume moss or by devil's club and oak fern.

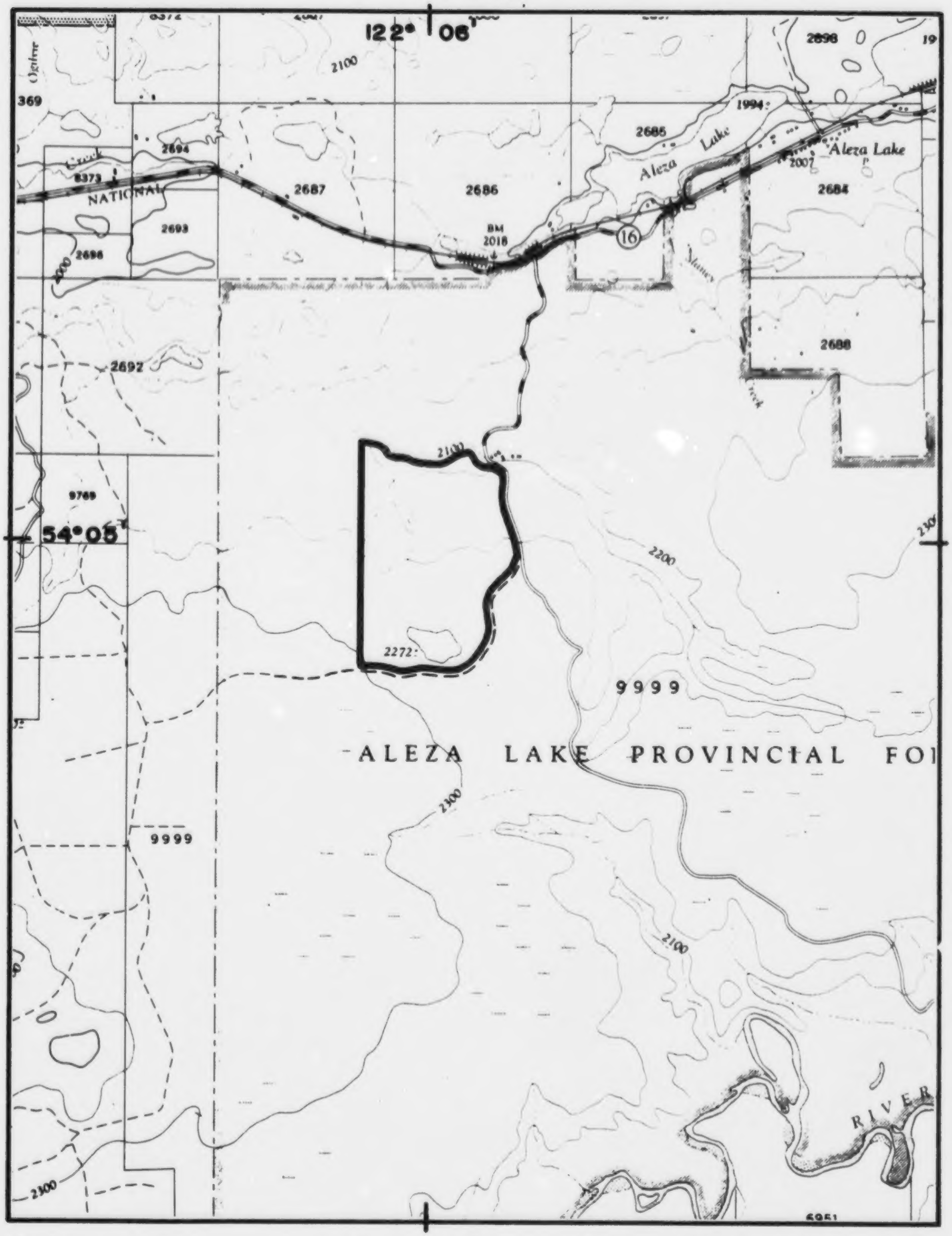
A few small bog forests consist of a black spruce - scrub birch - sphagnum moss association. Wetlands heavily dominated by beaked sedge occur around the lake margin, as well as a few ponded areas in which water sedge and buckbean predominate. Waterlily and other aquatic plants occur in shallow parts of the lake.

The fauna has not been described. Lands in this area have a moderate capability for production of moose. Snow depth limits the occurrence of deer.

OTHER INFORMATION: Order-in-Council no. 289, 10 February 1978. Application no. 216. Map no. 93 J/1. Access by road south from Old Highway 16, 3 km west of Aleza Lake village. A road follows the east and south reserve boundaries. The extreme southwest corner of the reserve has been logged, as has considerable land adjacent to it.

A partial list of plants has been prepared.

2-84B



122° 06'
54°05'
Aleza Lake
Aleza Lake
NATIONAL
Creek
16
BM 2018
2100
2200
2300
2272
9999
ALEZA LAKE PROVINCIAL FO
RIVER

SCALE 1:50000

N.T.S. No. 93 J/1

ECOLOGICAL RESERVE No. 84
ALEZA LAKE

PATSUK CREEK

E.R. #85

PURPOSE: To reserve excellent examples of paper birch forest and a rich assemblage of associated plants

LOCATION: 38 km NNW of Mackenzie

SIZE: 554 ha LAT: 55°38'N LONG: 123°23'W ELEVATION: 715 - 1555 m

BIOGEOCLIMATIC ZONES: Sub-boreal Spruce; Engelmann Spruce - Subalpine Fir

PHYSICAL FEATURES:

The reserve is situated on moderate to steep mountain slopes bordering Patsuk Creek, which flows from the Misinchinka Range into Parsnip Reach of Williston Lake via Six Mile Creek. Most of the reserve is south of the creek, with slope exposure to the northwest and west. Small, flat, alluvial sites occur along the fast-flowing stream which drops at a rate of about 20 m per km in this area.

BIOTIC FEATURES:

Stands of paper birch, not of widespread occurrence in the province, are an important feature here. These stands and smaller areas of aspen and lodgepole pine, in the Sub-Boreal Spruce Zone below about the 1075 m elevation, appear to have originated after a fire. Forest cover maps indicate the stands to be 60 - 80 years old.

Birch forest dominates on the cool, moist, northwesterly exposed slopes above Patsuk Creek. In places birch is mixed with aspen or white spruce, which also attain good growth here. In typical birch forest, trembling aspen is sub-dominant, Douglas maple characterizes the shrub layer, and mosses are abundant on the ground. A few shrubby openings support an association of Douglas maple, red elderberry, ostrich fern, stinging nettle, and moss, while alluvial flats along Patsuk Creek have developed a balsam poplar - Drummond's willow - soopolallie - lichen community. Aspen and lodgepole pine woods tend to occur at middle elevations on steep, dry, west-facing slopes. Scattered white spruce stands occur at middle elevations and just inside the southwest corner of the reserve.

In the Engelmann Spruce - Subalpine Fir Zone, which occupies about half of the reserve area, an Englemann spruce - subalpine fir - black huckleberry - bunchberry association is present.

One rare plant, the mountain bladder fern (Cystopteris montana) is associated with blue clay soils in the reserve.

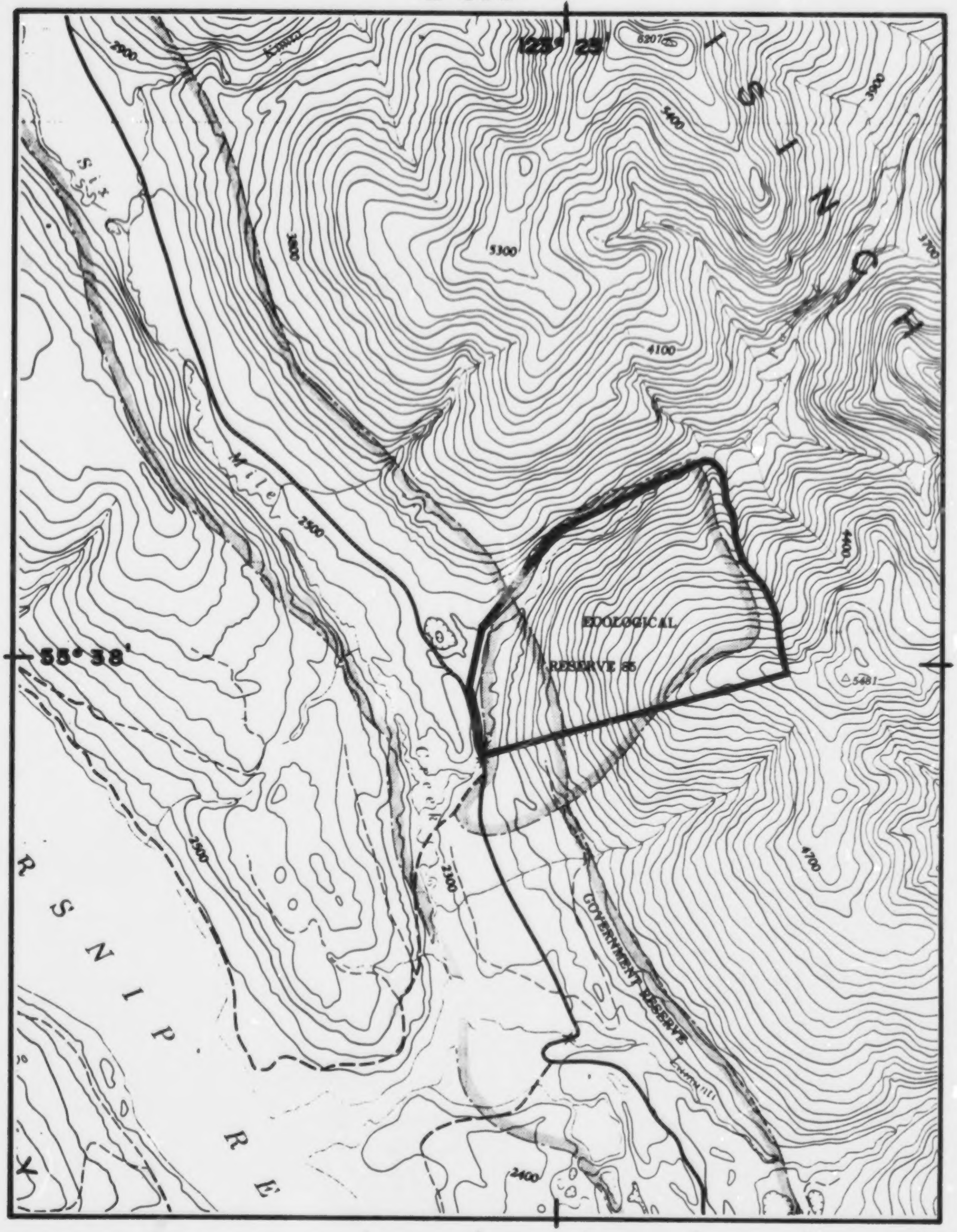
The fauna has not been surveyed, but moose and bears are known to be common. Arctic grayling occur in Patsuk Creek.

OUTSTANDING FEATURES: Relatively unusual forest stands dominated by paper birch.

OTHER INFORMATION: Order-in-Council no. 290, 10 February 1978. Application no. 222. Map no. 93 O/11. Access via Parsnip forest access road.

Logging is occurring adjacent to the western part of the reserve.

2-85B


123° 25'
2900
6207
I S I N C H
5400
3900
3700
3800
5300
4100
Six Mile Creek
2500
ECOLOGICAL RESERVE 85
55° 38'
△5481
4400
4700
2300
GOVERNMENT RESERVE
2400
R S N I P R E

SCALE 1:50000

1 0 1 2 3 4 km

N.T.S. No. 93 O/11

ECOLOGICAL RESERVE No. 85
PATSUK CREEK

BEDNESTI LAKE E.R. #86

PURPOSE: Preservation of representative wetland communities and disjunct tamarack stands on the Interior Plateau

LOCATION: 45 km W of Prince George, 2.5 km S of Highway 16

SIZE: 139 ha LAT: 53°52'N LONG: 123°27'W ELEVATION: 820 - 845 m

BIOGEOCLIMATIC ZONE: Sub-boreal Spruce

PHYSICAL FEATURES:

This rectangular reserve, located on a nearly level portion of the Interior Plateau, contains two, small, bog-like lakes. These are connected by a small, meandering stream of imperceptible flow and drain northwestward into Cluculz Lake and the Nechako River. The climate, based on statistics for nearby Prince George, is characterized by 62 cm of precipitation per year (38% as snow) and mean daily January and July temperatures of -12°C and 15°C respectively.

BIOTIC FEATURES:

The lakes, about 12 ha in total area, are surrounded by a broad band of treeless wetland vegetation, beyond which are stands of coniferous forest. Wetland vegetation comprises about 15 ha of the reserve. Most of the wetland zone is made up of floating mats of sedge, particularly cordroot sedge, a species which in British Columbia is confined to the Sub-Boreal Spruce Zone. Some water sedge occurs at the outer margin of these sedge mats, which are slowly encroaching into the lakes. Communities dominated by buckbean and by pondweeds occur as narrow bands in shallow waters adjacent to the more extensive sedge stands. Toward the forest margin, shrubs such as scrub birch become common in the sedge habitats.

Boggy forests dominated by tamarack, black spruce, or a mixture of the two occur in low sites near the sedge wetlands. Scrub birch and sphagnum moss are characteristic understory species. Black arboreal lichens are abundant on the larch trees. Typical upland forests contain a mixture of white and black spruce and lodgepole pine, and have ground cover characterized by lingonberry, bunchberry and mosses.

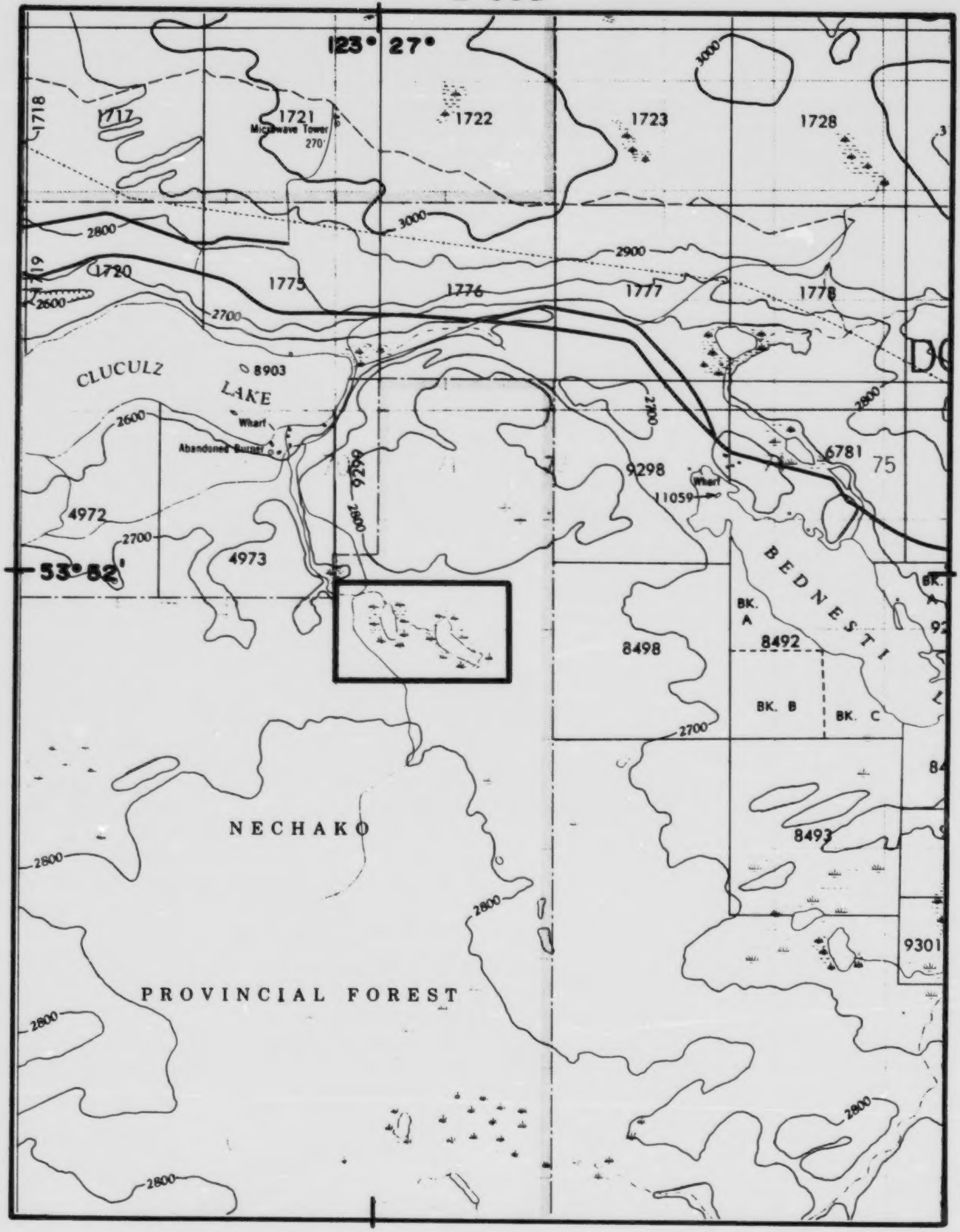
Both tamarack and cordroot sedge occur here as isolated populations well south of their more continuous subarctic ranges.

The fauna has not been inventoried but these wetlands provide excellent habitat for a variety of nesting and migrating waterfowl, and other aquatic wildlife such as beaver and muskrat.

OTHER INFORMATION: Order-in-Council no. 291, 10 February 1978. Application no. 207. Map no. 93 G/14. An access road, south from the east end of Cluculz Lake, passes through the western end of the reserve.

Logging has occurred on lands immediately south of the reserve.

2-86B


123° 27°
53° 52'
1717
1718
1719
1720
1721
Microwave Tower
270'
1722
1723
1728
3000
2800
2900
2700
2600
1775
1776
1777
1778
CLUCULZ
LAKE
8903
Wharf
Abandoned Burner
4972
4973
9299
9298
11059
6781
75
BEDNESTI
BK. A
8492
8498
BK. B
BK. C
8493
9301
NECHAKO
PROVINCIAL FOREST

SCALE 1:50 000

1
0
1
2
3
4 km

N.T.S. No. 93 G/14

ECOLOGICAL RESERVE No. 86
BEDNESTI LAKE

HEATHER LAKE E.R. #87

PURPOSE: Protection of representative trembling aspen stands and associated vegetation and fauna within the Sub-Boreal Spruce Zone

LOCATION: 23 km NNW of Mackenzie

SIZE: 235 ha LAT: 55°31'N LONG: 123°15'W ELEVATION: 730 - 885 m

BIOGEOCLIMATIC ZONE: Sub-Boreal Spruce

PHYSICAL FEATURES:

The reserve encompasses an elongate, well-drained, northwest-southeast trending ridge with a low, rounded summit. The ridge lies at the eastern edge of the floor of the Rocky Mountain Trench, a structurally controlled valley with considerable glacial drift on its floor. Two small lance-shaped lakes separated by narrows, and their inflow stream, mark the east boundary. These drain via a creek around the north end of the ridge and westward to Williston Lake. These are virtually the only aquatic/wetland habitats in the reserve. Numerous lakes lie on the trench floor just west of the reserve; the Misinchinka Ranges of the Rockies rise to the east.

BIOTIC FEATURES:

The feature of major interest is a fairly extensive, mature stand of trembling aspen with a dense, diverse understory of shrubs. This is a productive site for aspen growth compared to others in the region. White spruce also occurs, in some places as a dominant and in others as a sub-dominant in the aspen woods. Juvenile spruces occur in much of the aspen forest and, in the absence of fire, this species will probably become the climax dominant over much of the area.

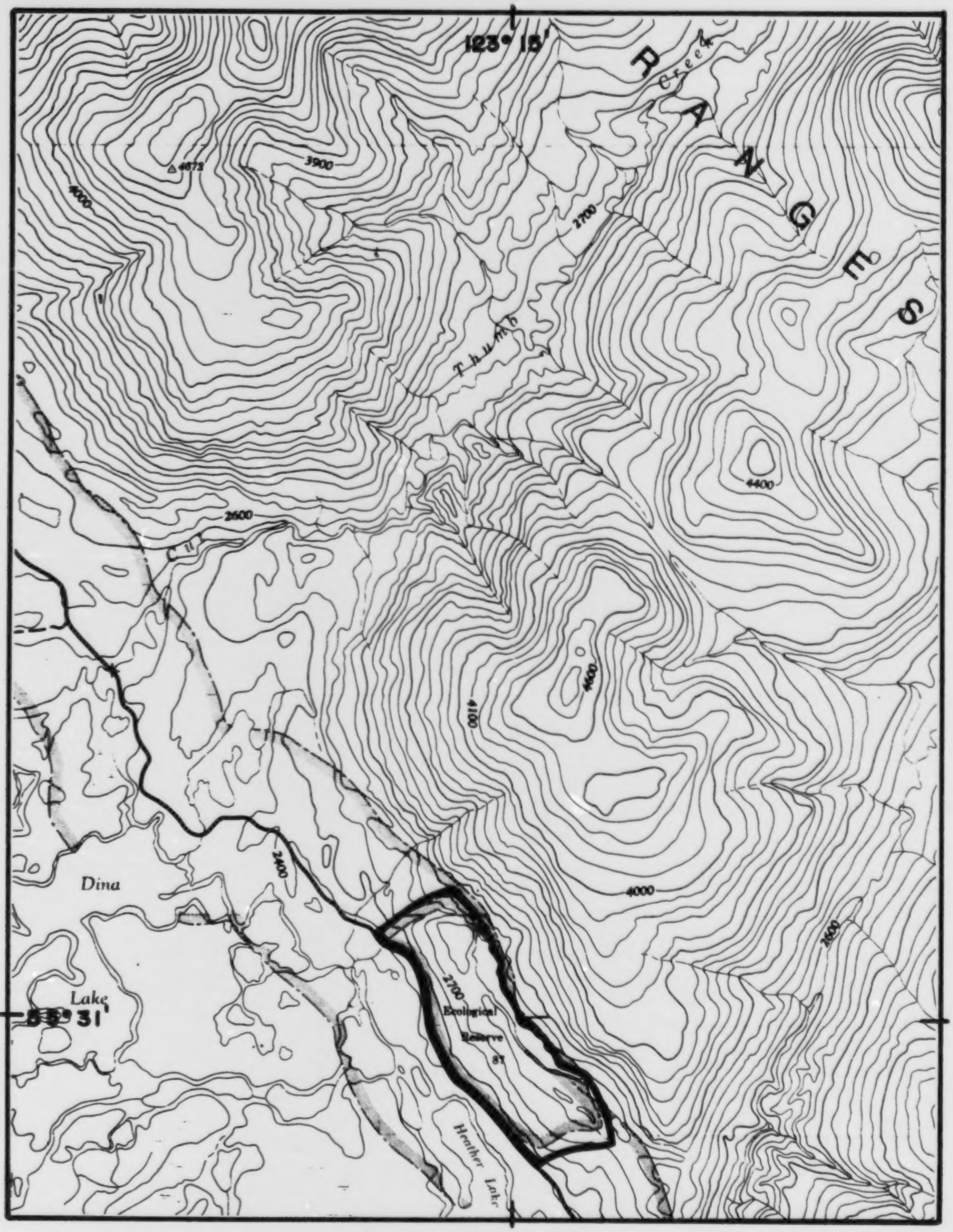
Only two communities have been described here to date. Typical aspen woods have a shrub layer characterized by Douglas maple and birch-leaved spirea, and herbaceous cover characterized by prince's pine and rattlesnake-plantain. Other common shrubs are Sitka alder, highbush-cranberry, red-osier dogwood, and red elderberry. In white spruce stands, black huckleberry is the typical shrub while queen's cup, bunchberry, and red-stemmed feather moss characterize the ground cover. Forest cover maps indicate that lodgepole pine stands also occur. Other trees present include subalpine fir, Engelmann spruce, paper birch and balsam poplar.

The fauna of the reserve has not been surveyed but this habitat type provides high quality winter range for moose. Aspen woodlands usually support a high diversity and abundance of small mammals and songbirds. Arctic grayling are reported to occur in the two lakes in the reserve.

OUTSTANDING FEATURES: An excellent and accessible site to study the flora and fauna of aspen-dominated ecosystems.

OTHER INFORMATION: Order-in-Council no. 292, 10 February 1978. Application no. 223. Map no. 93 O/11. Access via Parsnip forest access road.

2-87B


123° 15'
RANGES
Creek
△4672
3900
4000
2700
Thumb
4400
2600
4600
4100
4000
2600
2400
Dina
Lake
55° 31'
2700
Ecological Reserve 87
Heather Lake

SCALE 1:50000

1 0 1 2 3 4 km

N.T.S. No. 93 O/11

ECOLOGICAL RESERVE No. 87
HEATHER LAKE

SKWAHA LAKE

E.R. #88

PURPOSE: To preserve representative Interior Douglas Fir and Montane Spruce ecosystems, together with many diverse meadow communities containing outstanding wildflower displays and rare plants

LOCATION: In the Clear Range, 11 km W of Spences Bridge

SIZE: 850 ha LAT: 50°24'N LONG: 121°31'W ELEVATION: 1140 - 1740 m

BIOGEOCLIMATIC ZONES: Interior Douglas Fir; Montane Spruce; Engelmann Spruce - Subalpine Fir

PHYSICAL FEATURES:

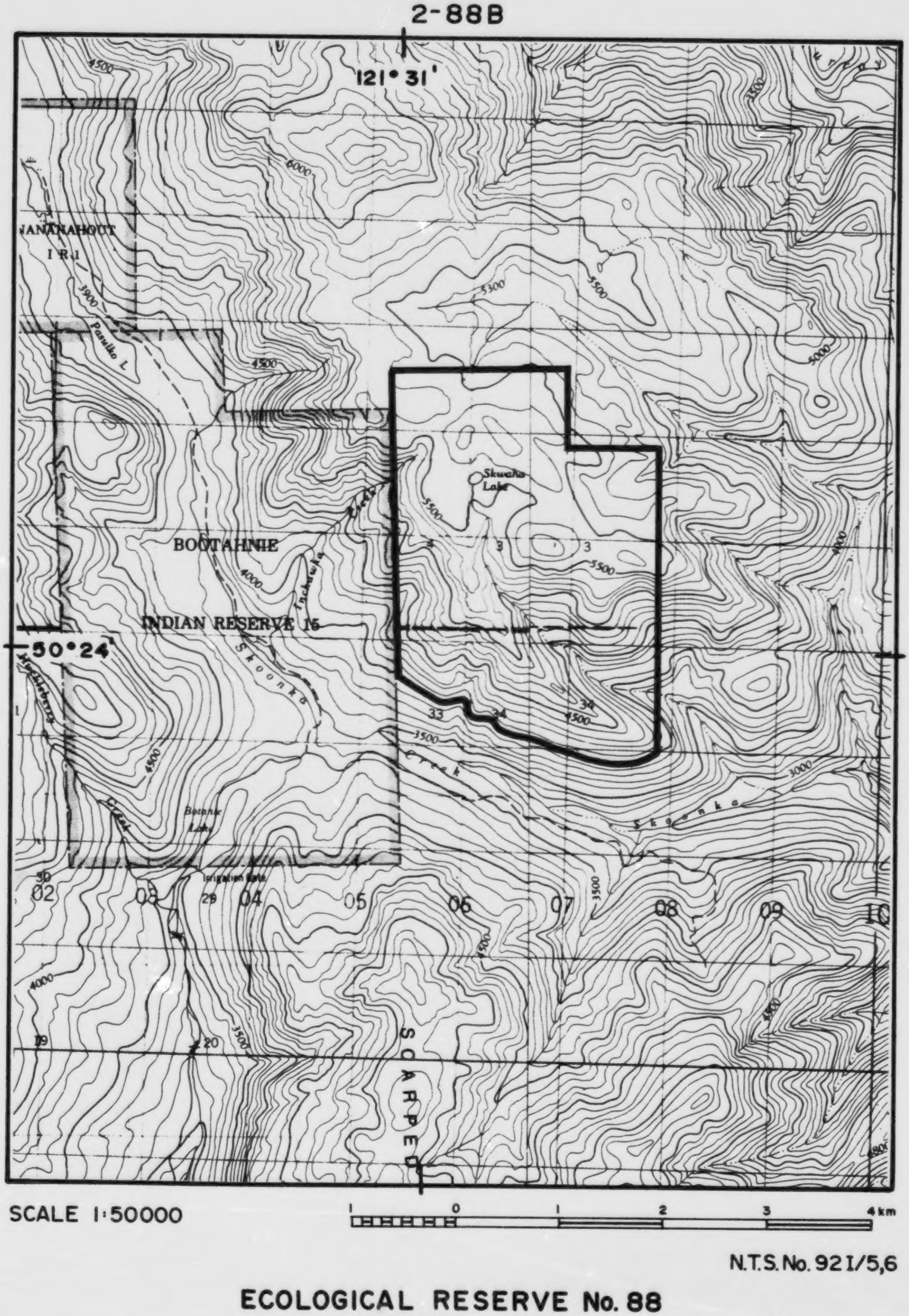
The reserve is near the southern end of the Clear Range which occupies the "V" between the Thompson and Fraser Rivers, north of Lytton. The reserve has two major landforms, a rolling summit above the 1650 m elevation in the north, and steep valley slopes in the south. The predominant aspect is south and southwest. Soils are primarily Brunisols, characteristic of moderately open coniferous forest zones. Drainage is entirely via small tributaries of Skoonka Creek, eastward into the Thompson River. The climate is moderately dry due to the rain-shadow effect of the Coast Ranges, however precipitation increases markedly with elevation and considerable snow accumulates in the summit area.

BIOTIC FEATURES:

Variations in elevation, exposure, soil moisture, and fire history result in a very complex mosaic of mature forest, burned forest, and meadows in this reserve. The tree cover here, over an elevational range of only 600 m, contains such ecologically diverse elements as scattered ponderosa pine trees and subalpine fir stands. Grass-forb meadows, many with spectacular wildflower stands, are widespread at lower and middle elevations as a result of the generally dry climate, southerly exposure, and occurrence of wildfire. Large alpine - subalpine meadows also occur in a parkland setting among subalpine forest stands on the summit.

The Douglas Fir Zone, with an understory of pinegrass, occurs primarily below the 1500 m elevation at the lower fringe of the reserve, and contains a few scattered ponderosa pine trees and aspen groves. The Montane Spruce Zone, characterized by Engelmann spruce - lodgepole pine stands, is mostly between the 1525 and 1675 m levels, while the Engelmann Spruce - Subalpine Fir Zone is restricted to the summit area, primarily above the 1675 m elevation. Burned forests, at various elevations in the eastern half of the reserve, are largely dominated by juvenile lodgepole pine.

Eight meadow communities have been described and mapped, four within the Douglas Fir and Montane Spruce zones and four in the subalpine area. The lowest elevation meadows, usually on moderate south-facing slopes, are dominated by an association of arrow-leaved balsam-root and grasses, the dominant grass on grazed sites being Kentucky bluegrass, that on ungrazed sites bluebunch wheatgrass. Acres of densely packed balsamroot plants,


2-88B
121° 31'
NANAHOUT
I.R.1
Panilko L.
Skwaha Lake
BOOTAHNIE
INDIAN RESERVE 15
Inchuwka Creek
Skoonka
50°24'
Huckleberry Creek
Botanie Lake
Irrigation Dam
Creek
Skoonka
SCARPED
02
03
04
05
06
07
08
09
10
6000
5500
5300
5000
4500
4000
3900
3500
3000

SCALE 1:50000

1 0 1 2 3 4 km

N.T.S. No. 92 I/5,6

ECOLOGICAL RESERVE No. 88
SKWAHA LAKE

together with less abundant species like common red paint-brush and upland larkspur, present a spectacular sight during the peak of flowering. These meadows give way with increasing elevation to the pinegrass - balsamroot community. At middle to upper elevations, two other communities dominated by pinegrass also occur.

The most extensive subalpine meadows are dominated by Indian hellebore, cow-parsnip, and arctic lupine but include other showy species like Sitka valerian, western and arrowleaved groundsel, and glacier lily. Less extensive moist, subalpine meadows support sharptooth angelica - western groundsel, and Sitka valerian - Indian hellebore - globeflower communities. On exposed subalpine ridges, a community complex characterized by thread-leaved sandwort has been recognized in which associated species include pussytoes, old man's whiskers, Rocky Mountain fescue, balsamroot, and pinegrass.

To date, 273 species of vascular plants have been recorded in this reserve, of which at least 16 are rare in British Columbia. Rare plants include alpine-wintergreen (*Gaultheria humifusa*), Hooker's onion (*Allium acuminatum*), large-flowered triteleia (*Triteleia grandiflora*), white triteleia (*Triteleia hyacinthina*), Raynold's sedge (*Carex raynoldsii*), alpine Indian paintbrush (*Castilleja rhexifolia*), mountain lady's-slipper (*Cypripedium montanum*), many-flowered hackelia (*Hackelia floribunda*), blue hackelia (*H. micrantha*), Nuttall's sunflower (*Helianthus nuttallii*), little sunflower (*Helianthella uniflora*), Fendler's waterleaf (*Hydrophyllum fendleri*), alpine lewisia (*Lewisia pygmaea*), and purple onion grass (*Melica spectabilis*).

The reserve provides excellent summer range for mule deer, and for a herd of Rocky Mountain bighorn sheep which was introduced to the Spences Bridge area. Coyotes and black bears have been noted. Horned larks and waterpipits are common in alpine areas. Other birds recorded here include the blue grouse, golden eagle, red-tailed hawk, pileated woodpecker, common flicker, Clark's nutcracker, gray jay, Steller's jay, red crossbill, and several species of warblers, chickadees, and sparrows.

OUTSTANDING FEATURES: Extensive meadows in three biogeoclimatic zones, containing an exceptional diversity of showy wildflowers and several plants that are rare in British Columbia.

OTHER INFORMATION: Order-in-Council no. 293, 10 February 1978. Application no. 187. Map no. 92 I/5; I/6. Access to the vicinity of the reserve boundary is possible via Botanie Lake road which branches right from Highway 12 across the Thompson River from Lytton.

The Order-in-Council creating this reserve allows cattle grazing to continue subject to maintenance of good range condition. Grazing occurs in both the subalpine and lower elevation meadows and has resulted in localized displacement of plant communities from the climax state, trampling damage, and trails. Due to the fairly rugged topography however, substantial areas are grazed very lightly or not at all.

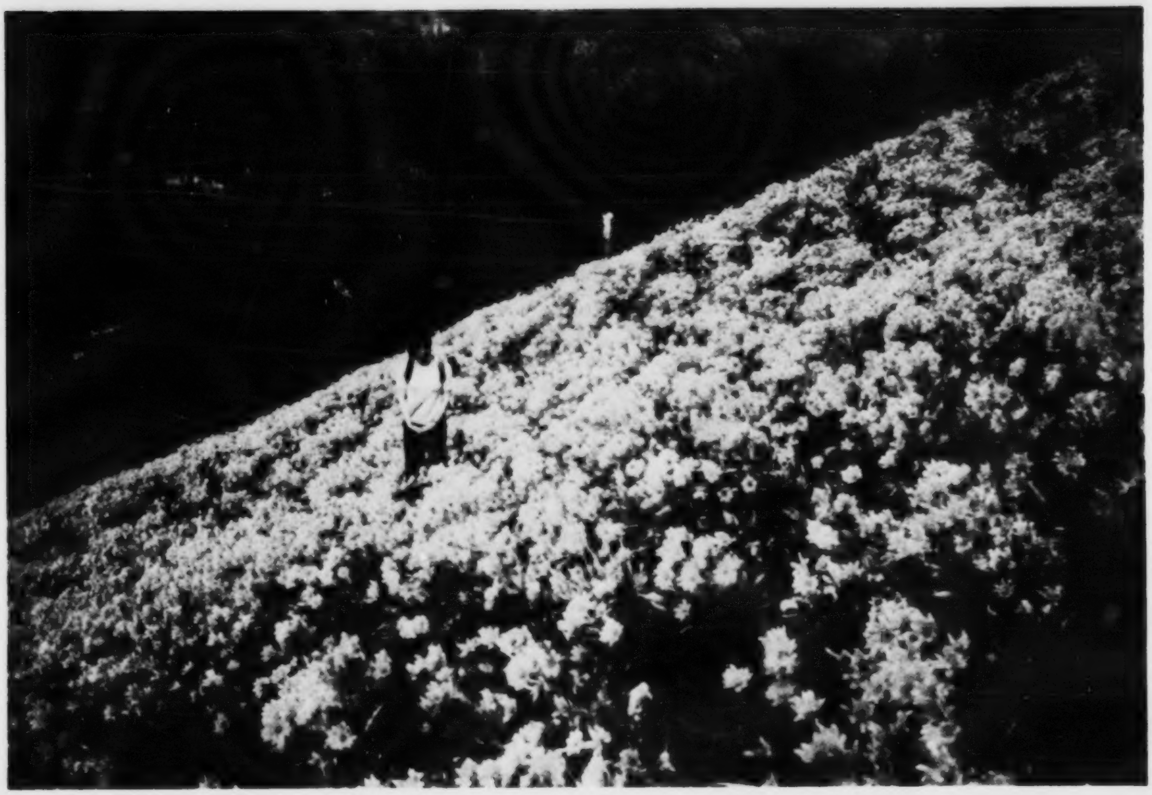


Figure 11. Protection of Unique Vegetation Features in the Skwaha Lake Ecological Reserve (#88)

A stunning display of native wildflowers is protected in the Skwaha Lake Ecological Reserve (#88) near Lytton. (Photo J. Pojar)

SKAGIT RIVER COTTONWOODS E.R. #89

PURPOSE: To maintain stands of alluvial black cottonwoods for purposes of hybridization and stock improvement

LOCATION: Upper Skagit River Valley, 5 km SW of Highway 3 at Sumallo-Skagit confluence; 20 km N of Ross Lake

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SIZE: 69 ha LAT: 49°10'N LONG: 121°07'W ELEVATION: 565 - 640 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

The reserve is on the floodplain of the Skagit River, a relatively small, fast-flowing river with a gradient of about 6 m/km. The northeast-southwest trending valley, located in the Hozameen Ranges of the Cascade Mountains, is bounded by slopes of about 30° which rise to peaks of 2,100 - 2,500 m. The valley is relatively straight, the river slightly sinuous within its narrow floodplain. Bedrock is of the Hozameen series, made up of Cretaceous sediments and much volcanic material. Upon retreat of Pleistocene glaciers an accumulation of poorly sorted debris was left behind. This has been resorted by the Skagit River and tributary streams to form the present alluvial valley bottom deposits. Soils have not been described. Talus slopes border part of the reserve on its west side. Climate is transitional between that of the wet coast and dry interior.

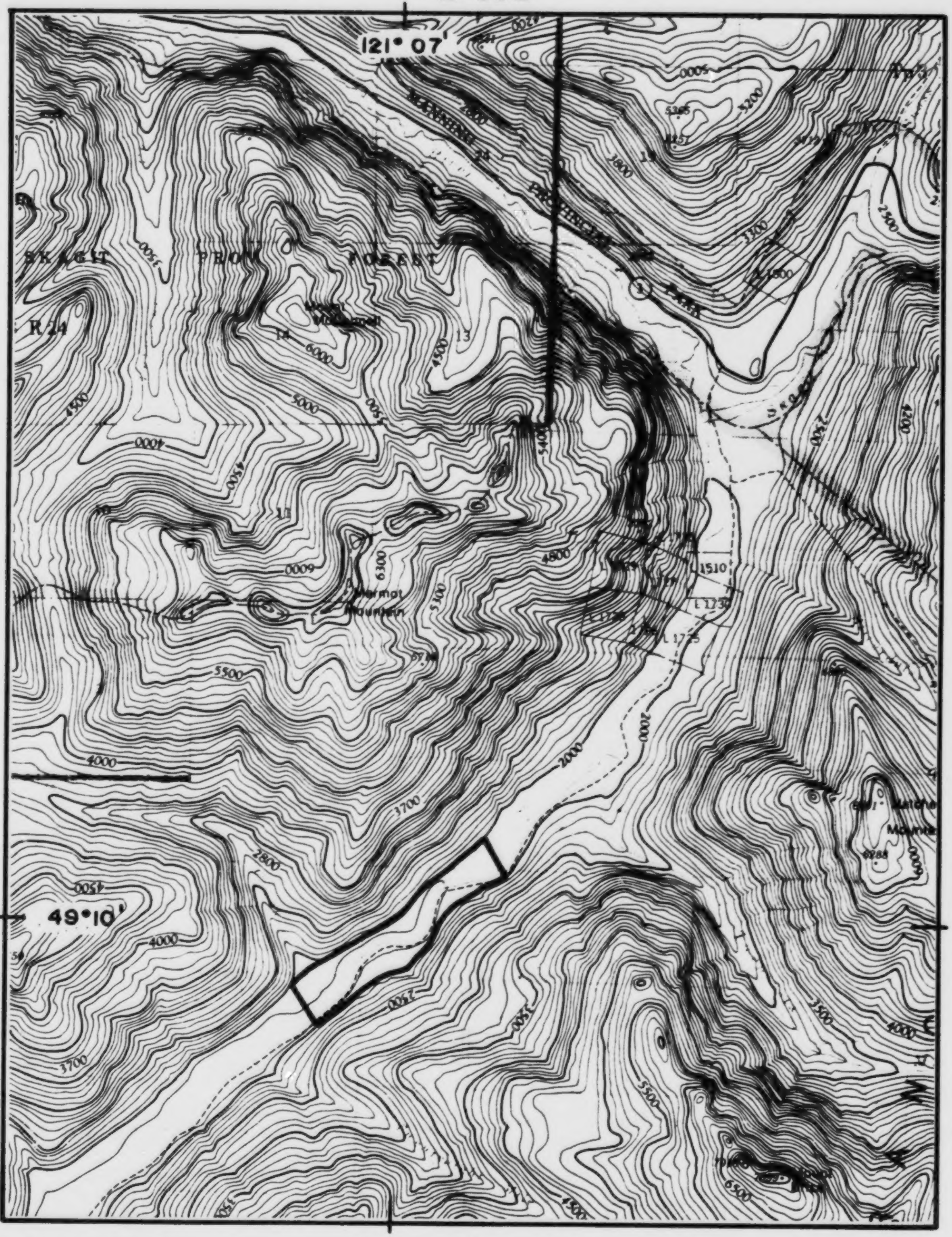
BIOTIC FEATURES:

Black cottonwood trees at this site are mostly in mixed stands containing conifers, including western redcedars up to 2 m in diameter, and some Douglas fir, grand fir, and bigleaf maple. Douglas fir - western redcedar stands occur on the fan of Marmotte Creek, and Douglas fir is the characteristic tree of the lower mountain slopes. The shrubs red-osier dogwood, hazelnut, thimbleberry, and salmonberry are common in the floodplain forest understory, together with sword fern. Other trees recorded in this area are amabilis fir, Engelmann spruce, western white pine and western hemlock.

The fauna has not been surveyed. Rainbow trout, dolly varden char, and eastern brook trout (introduced) are known to occur in the upper Skagit system, and probably are present in the reserve.

OTHER INFORMATION: Order-in-Council no. 1104, 4 May 1978. Application no. 235. Map no. 92 H/3. Access by foot only, along the Skagit River (Whatcom) Trail. This involves a 5.5 km walk from Highway 3 at Sumallo Grove or a similar distance from km 42.5 of the Silver-Skagit (Ross Lake) Road. The trail stays on the east side of the river. This reach of the Skagit is not suitable for canoeing.

2-89B


121° 07'
SKAGIT PROV FOREST
R 24
PROVINCIAL PARK
Marmot Mountain
49°10'
L 1510
L 1730
L 1735
6000
5500
5000
4500
4000
3700
2800
2000
1
0
1
2
3
4 km

SCALE 1:50000

N.T.S. No. 92 H/3

ECOLOGICAL RESERVE No. 89
SKAGIT RIVER COTTENWOODS

SUTTON PASS

E.R. #90

PURPOSE: To protect one of the few known occurrences of adder's-tongue fern in British Columbia

LOCATION: Beside Highway 4 in Sutton Pass, 25 km W of Port Alberni

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SIZE: 3.4 ha LAT: 49°17'N LONG: 125°21'W ELEVATION: 215 - 235 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

The reserve lies in a narrow valley bottom in a pass between the Taylor and Kennedy River drainages, surrounded by peaks of the Vancouver Island Ranges. A small pond dammed by an ancient rockslide lies near the middle of the reserve, and is subject to pronounced seasonal variations in water level and areal extent. It is normally lowest in late summer, when much bare gravel and mud may be exposed, but even then can rise considerably in response to heavy rainfall.

BIOTIC FEATURES:

The reserve contains typical western hemlock - western redcedar forest and associated plants, as well as areas logged and/or cleared for the highway right-of-way, but the plant associations of greatest interest are the herb and shrub types which occur as concentric rings around most of the pond. It is here that the strange unfernlike Adder's-tongue fern Ophioglossum vulgatum, with its snake-like fruiting parts and tiny netveined leaves may be found.

Herbaceous communities between the pond edge and shrub zone are dominated by a mosaic of aquatic sedges and spear-leaved buttercup, by adder's-tongue fern, by slough sedge, or by tufted hairgrass. Plants commonly growing with the adder's-tongue fern are marsh violet, spear-leaved buttercup, marsh speedwell, and St. John's-wort. The shrubby zone between the herbaceous community and the forest is dominated by willows.

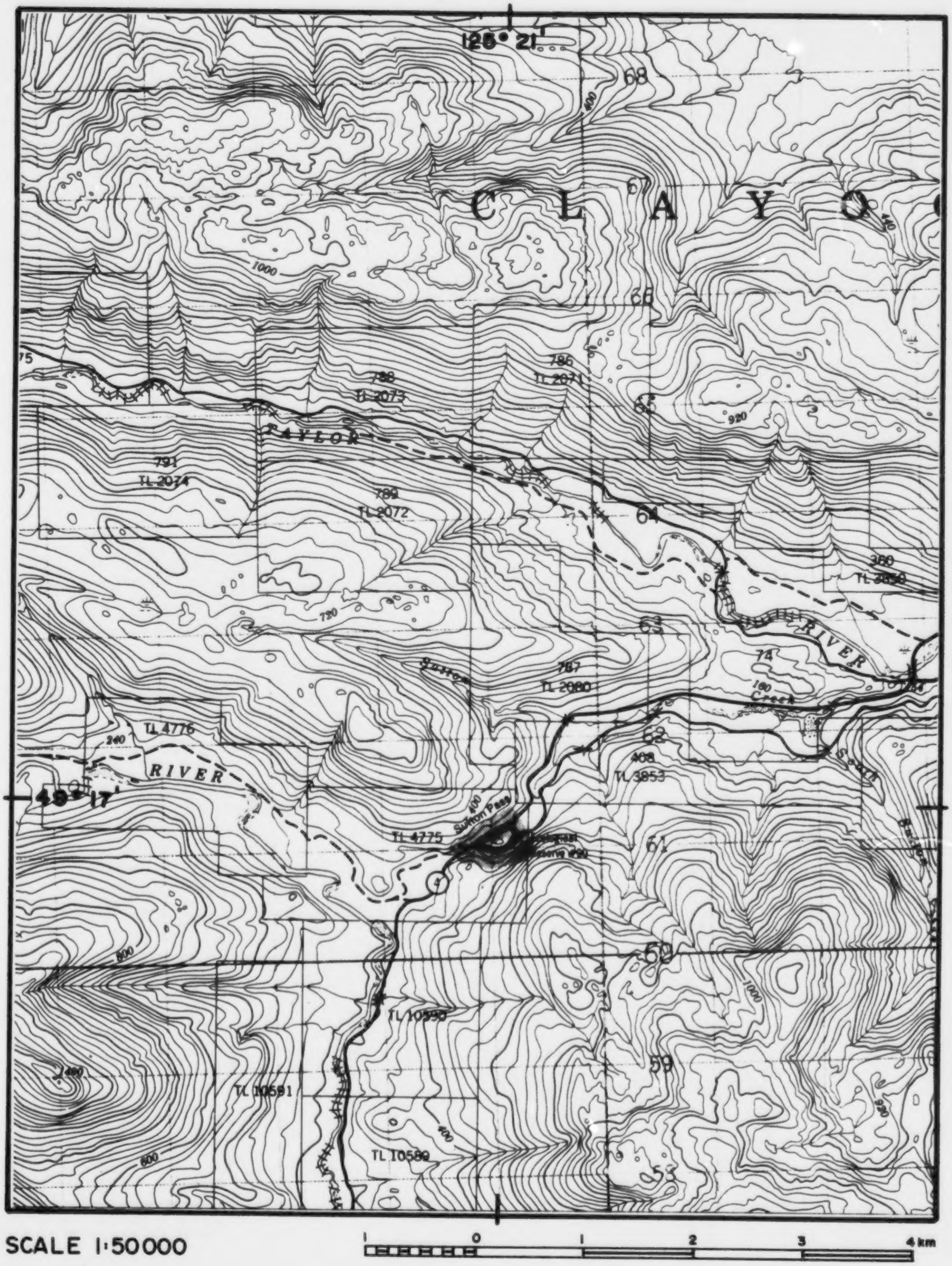
The adders-tongue fern occur mainly on moist sites at the margin of the shrub zone. Fluctuations in the pond level are probably critical for maintaining the herbaceous zone and preventing shrubs from advancing. This action allows small herbs adapted to seasonal flooding, like the adder's-tongue fern, to survive with minimal competition for light.

OUTSTANDING FEATURES: One of only four or five known British Columbia localities of the adder's-tongue fern.

OTHER INFORMATION: Order-in-Council no. 1105, 4 May 1978. Application no. 245. Map no. 92 F/6.

Part of the reserve has been disturbed by previous right-of-way clearing and road construction. Further road work, or logging upslope from the reserve, could affect the water level regime of the pond and have an impact on plants growing around it, including the adder's-tongue fern.

2-90B



125° 21'
CLAYOQ
68
66
65
64
63
62
61
60
59
58
788 TL 2073
786 TL 2071
791 TL 2074
789 TL 2072
787 TL 2080
360 TL 3850
408 TL 3853
TL 4776
TL 4775
TL 10590
TL 10591
TL 10589
TAYLOR
RIVER
Sutton
Creek
74
Sutton Pass
49° 17'
1000
920
730
600
800
400
1400
240

SCALE 1:50000

1 0 1 2 3 4 km

N.T.S. No. 92 F/6

ECOLOGICAL RESERVE No. 90
SUTTON PASS

RASPBERRY HARBOUR

E.R. #91

PURPOSE: Preservation of outstanding lodgepole pine stands and adjacent bogland near the northern edge of the Sub-boreal Spruce Zone

LOCATION: W side of Williston Lake, 144 km W of Hudsons' Hope

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SIZE: 143 ha LAT: 56°06'N LONG: 124°14'W ELEVATION: 700 - 710 m

BIOGEOCLIMATIC ZONE: Sub-boreal Spruce

PHYSICAL FEATURES:

The reserve is located on the flat, eastern half of a peninsula between Omineca Arm and Finlay Reach of Williston Lake. This level land on the floor of the Rocky Mountain Trench, underlain by much material of glacial origin, existed as a terrace above the Finlay River before the flooding of Williston Lake. Most of the reserve is saturated bogland, but its eastern edge rises a few meters above bog level and is well-drained. Adjacent hills, about 1 km west of the reserve, rise to 1100 m.

BIOTIC FEATURES:

The reserve consists of about 35% treeless bog, 35% black spruce bog, 5% black spruce forest and 25% upland forest (largely lodgepole pine - trembling aspen). Small areas containing white spruce occur at the transition between bog and upland forest. Eight communities have been described.

The wet open bogland is characterized by scrub birch, bog cranberry, and mosses, including sphagnum. In standing water areas, largely in the finger at the north end of the reserve, a buckbean - marsh cinquefoil - swamp horsetail association is present.

Bog forest surrounding the open bog has well-spaced black spruce of poor growth, a shrub layer dominated by scrub birch, and ground cover of mosses. Small areas of dense black spruce forest with an understory characterized by bunchberry and mosses occur in the northwest and southeast corners of the reserve.

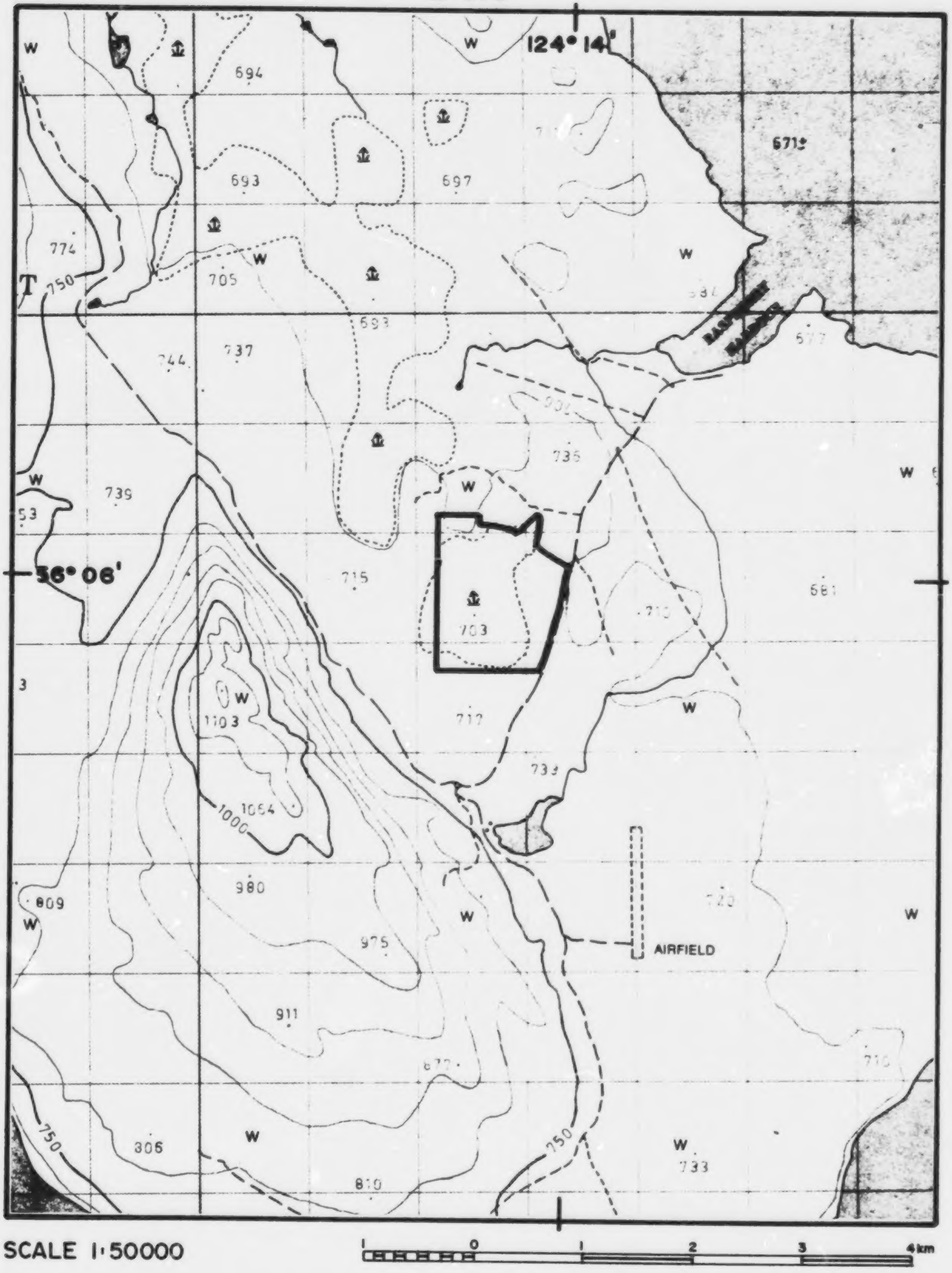
White spruce stands are of the white spruce - subalpine fir - oak fern - moss, or spruce - black huckleberry - moss type. Upland lodgepole pine trees in the eastern part of the reserve exhibit excellent growth and are unusually tall. Some aspen is scattered through these woods, described as the lodgepole pine - bunchberry - red stemmed feather moss community.

The fauna has not been surveyed, but a variety of bogland and forest species are expected to occur.

OUTSTANDING FEATURES: Exceptionally tall lodgepole pine trees.

OTHER INFORMATION: Order-in-Council no. 1265, 18 May 1978. Application no. 219. Map no. 94 C/1. Access via logging roads from Raspberry Harbour on Williston Lake. One such road marks the east boundary of the reserve. Some lands adjacent to the reserve were logged in the early 1970's but the reserve itself is in a natural state.

2-91B


124° 14'
56° 06'
694
693
697
671
774
750
705
693
744
737
739
736
715
703
710
681
712
733
1103
1064
1000
980
975
911
809
720
AIRFIELD
710
306
810
750
733
W
0
1
2
3
4km

SCALE 1:50000

N.T.S. No. 94 C/1

ECOLOGICAL RESERVE No. 91
RASPBERRY HARBOUR

SKIHIST

E.R. #92

PURPOSE: Conservation of undisturbed ponderosa pine - grassland vegetation

LOCATION: 5 km NE of Lytton, on banks of Thompson River

SIZE: 36 ha LAT: 50°15'N LONG: 121°31'W ELEVATION: 135 - 215 m

BIOGEOCLIMATIC ZONE: Ponderosa Pine

PHYSICAL FEATURES:

The reserve is in the bottom of the deeply incised Thompson River valley where the river cuts westward through the north end of the Cascade Range to join the Fraser. It consists of gently sloping benchlands which give way to steep, gullied slopes near the river edge. The general aspect is northerly. Very low elevation for an interior site, and the rain-shadow effect of the Coast Mountains, result in an arid climatic regime.

BIOTIC FEATURES:

The sloping benchland is characterized by well-spaced stands of ponderosa pine with ground cover of bluebunch wheatgrass and arrow-leaved balsam-root. In a few small areas, shrubs such as Saskatoon, mock-orange, and sumac are present. Additional grasses are Idaho fescue, needle-and-thread grass, and Sandberg's bluegrass; characteristic forbs include round-leaved alumroot, narrow-leaved skeletonweed, yarrow, low pussytoes, lemonweed, and sagebrush buttercup. Balsam-root, thread-leaved phacelia, asters, brown-eyed Susan, Menzies' larkspur, and yellow bell provide showy blooms in spring.

On the banks near the river a few Douglas maple, black cottonwood, Douglas fir and Rocky Mountain juniper are present, as well as kinnikinnick, red-osier dogwood, and rabbitbush.

One plant that is rare in British Columbia, the white meconella (Meconella oregana) has been reported to occur here. Normally confined to the Coastal Douglas Fir zone, this may be its most eastern occurrence in the province.

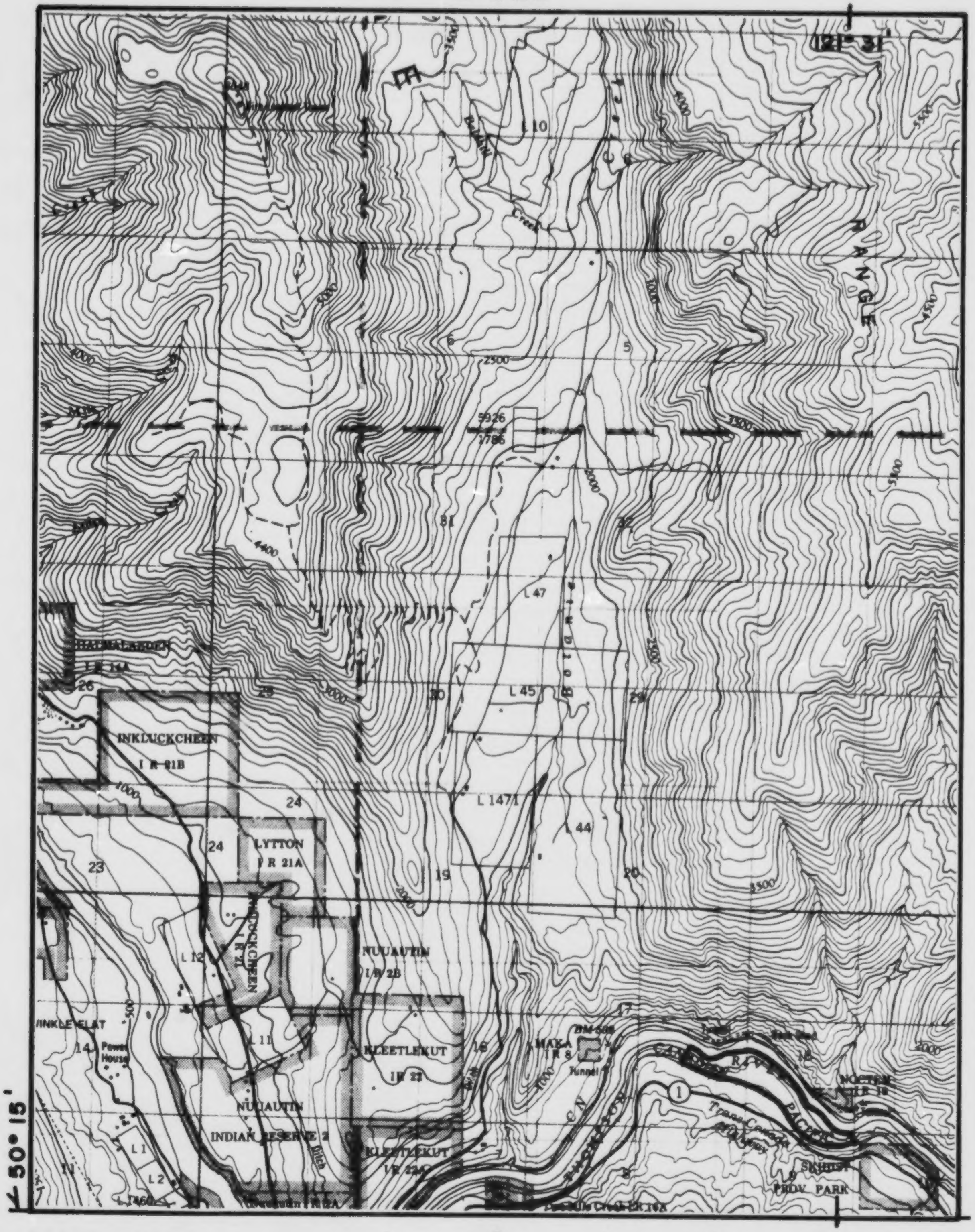
Birds recorded in the reserve include the rufous hummingbird, common flicker, red-breasted nuthatch, American robin, Townsend's solitaire, yellow-rumped warbler, Brewer's blackbird, brown-headed cowbird, rufous-sided towhee, red crossbill, dark-eyed junco, and white-crowned sparrow.

OUTSTANDING FEATURES: Five depressions on the bench above the river suggest prehistoric use by native people.

OTHER INFORMATION: Order-in-Council no. 1729, 29 June 1978. Application no. 62. Map no. 92 I/5. Access by short walk from Highway 1. Skihist Provincial Park is immediately to the east.

The location of this reserve, between the CPR tracks and Thompson River, has made it inconvenient for logging or grazing, therefore it persists in a relatively natural state.

2-92B



121° 31'
50° 15'
RANGE
5926
2786
L 47
L 45
L 1471
L 44
L 12
L 11
L 1
L 2
INKLUCKCHEEN
I R 21B
LYTTON
I R 21A
I R 21
NUUAUTIN
I R 2B
KLEETLEKUT
I R 22
NUUAUTIN
INDIAN RESERVE 2
KLEETLEKUT
I R 22A
MAKA
I R 8
Tunnel
NOCTEN
I R 18
SKIHIST
PROV. PARK
Trans-Canada Highway
CN
THOMPSON
CANADIAN PACIFIC
1
Power House
Ditch
WINKLE FLAT
Creek

SCALE 1:50000

1 0 1 2 3 4 km

N.T.S. No. 92 I/5

ECOLOGICAL RESERVE No. 92
SKIHIST

LEPAS BAY

E.R. #93

PURPOSE: Preservation of nesting seabirds, mainly petrels, and their habitat

LOCATION: Unnamed island in Lepas Bay 3 km SE of Cape Knox, NW corner of Graham Island, Queen Charlotte Islands

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SIZE: 3.6 ha LAT: 54°10'N LONG: 133°03'W ELEVATION: 0 - 20 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

The reserve comprises, a small, oval-shaped island near the head of Lepas Bay, about 150 m from shore. Although the island is low, most of its shoreline is steep and rocky, including vertical cliffs on the southwest side, which is exposed to the open ocean. Beaches are absent. The hilly central part of the island has a thin soil cover which varies from stony to organic in composition, and is enriched by seabird faeces and food remains.

BIOTIC FEATURES:

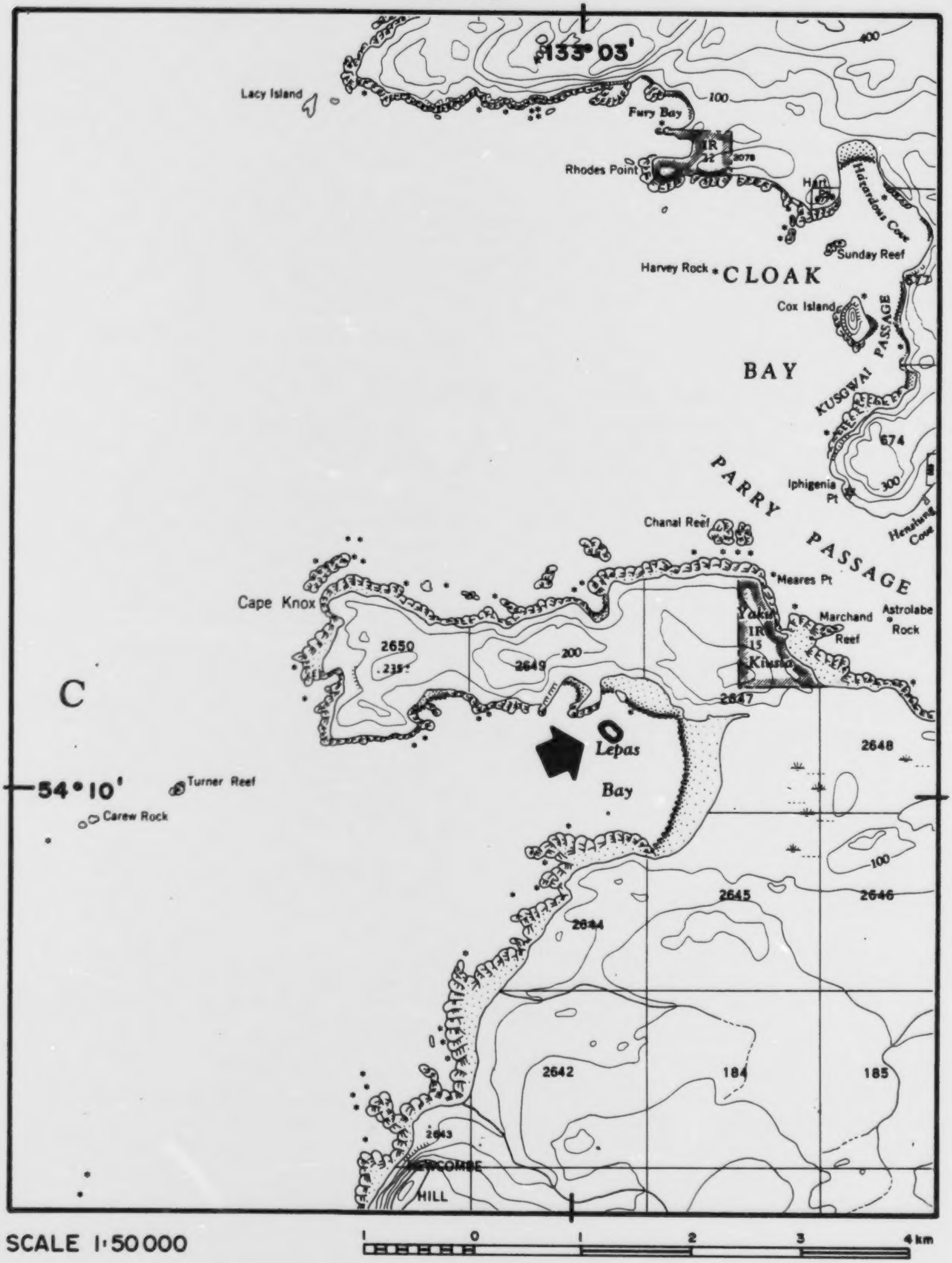
The interior of the island supports an open stand of wind-swept, stunted, Sitka spruce, with an understory of moss and false lily-of-the-valley. Grassy slopes, largely peripheral to the central forest, cover about 60% of the island and support dense stands of Pacific reed-grass, with Siberian miner's lettuce scattered among the grass, and occasional salmonberry shrubs. Small moist meadows among and at the edge of the forest support northern rice-root, Pacific hemlock-parsley, monkey-flower, and seacoast angelica. Villous cinquefoil and roseroot grow in crevices between rock exposures. Small stands of dune wildrye occur on poorly developed soil at the south end of the island.

The island is a nesting site for an estimatd 3400 pairs of fork-tailed storm-petrels, 4300 pairs of Leach's storm-petrels, 60 or more pairs of Cassin's auklet, 50 pairs of pigeon guillemots, and two pairs of black oystercatchers. The island is one of only eight storm-petrel nesting sites in British Columbia and may be the largest mixed-species petrel site in the province. These interesting burrow-nesting seabirds lay only one egg. They leave and return to the nest only at night, and feed on the ocean surface far from shore. By day their rather inconspicuous burrows are the only evidence of their presence. The fork-tailed species begins nesting in late May, but Leach's not until mid June. Young may be in the burrows until late summer.

OUTSTANDING FEATURES: This is an important nesting site for storm-petrels, and vulnerable to damage through human trampling or introduction of predators.

OTHER INFORMATION: Order-in-Council no. 2751, 2 November 1978. Application no. 289. Map no. 103 K/3. Marine chart no. 3862; 3868. Accessible only by boat. The reserve contains no intertidal or subtidal area.

2-93B


133° 03'
Lacy Island
100
400
Fury Bay
IR 32
Rhodes Point
Hazardous Cove
Sunday Reef
Harvey Rock
CLOAK
Cox Island
BAY
KUSOWAI PASSAGE
674
PARRY PASSAGE
Iphigenia Pt
300
Henslung Cove
Chanal Reef
Meares Pt
Cape Knox
Marchand Reef
Astrolabe Rock
Yaku IR 15
Kiusta
2650
2649
200
2647
2648
C
Lepas Bay
54° 10'
Turner Reef
Carew Rock
2645
2646
2644
2642
184
185
2643
NEWCOMBE HILL
1 0 1 2 3 4 km

SCALE 1:50 000

N.T.S. No. 103 K/3

ECOLOGICAL RESERVE No. 93
LEPAS BAY

OAK BAY ISLANDS

E.R. #94

PURPOSE: To protect vulnerable nesting seabirds, uncommon meadow communities, showy and rare early spring wildflowers, and representative shallow-water marine habitats

LOCATION: The reserve has three units, the largest (Great Chain Island and Chain Islets) being 2 km E of Oak Bay. Jemmy Jones Island is 2.5 km N of Great Chain Island in Baynes Channel; Alpha Island, part of the Chatham-Discovery Group, is 5.5 km E of Oak Bay

---

SIZE: 170 ha LAT: 48°25-27'N LONG: 123°14-17'W ELEVATION: -9 to 15 m

BIOGEOCLIMATIC ZONE: Coastal Douglas Fir

PHYSICAL FEATURES:

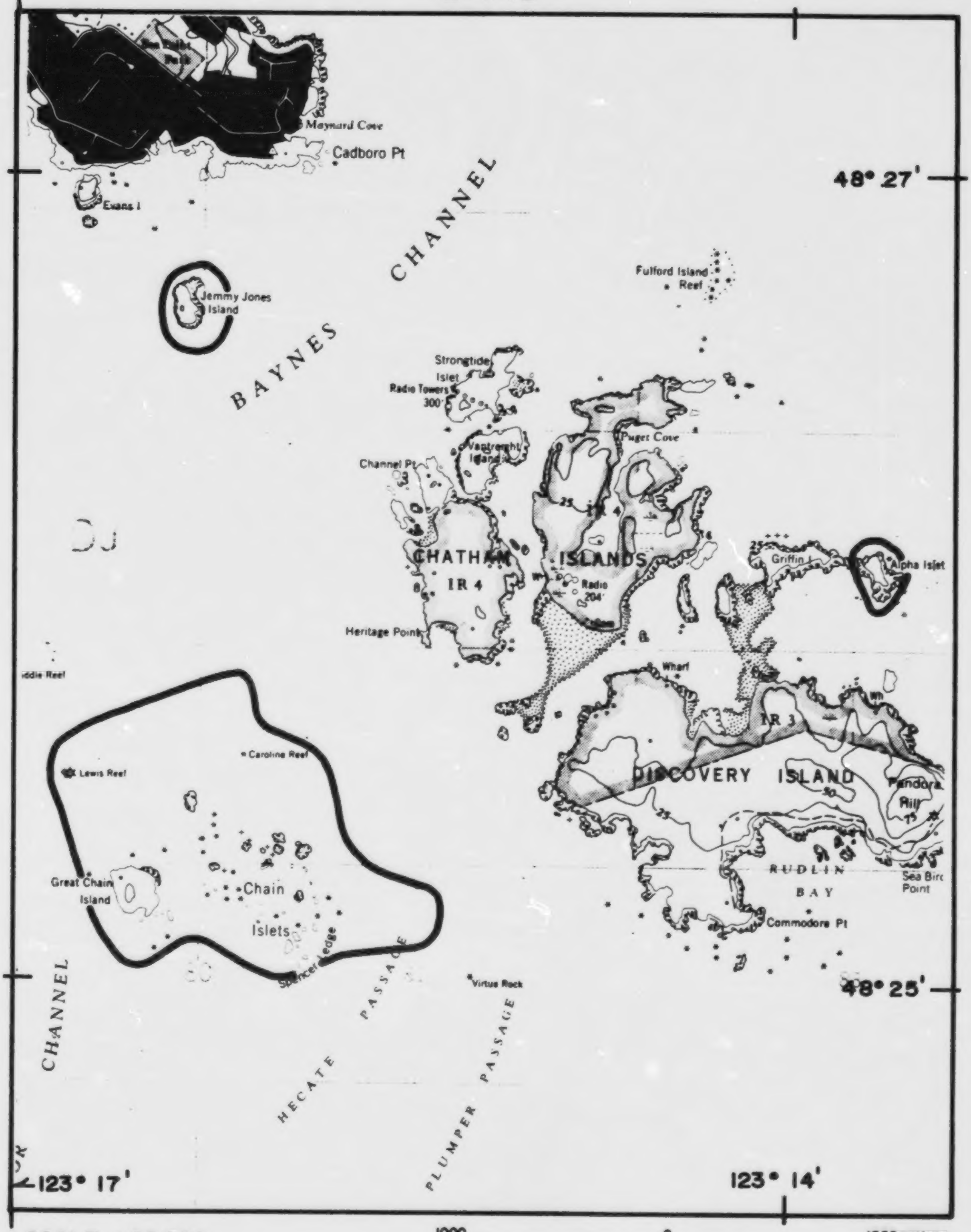
Islands and islets comprise about 7 ha of the reserve, the remainder being subtidal. The islands are low, rounded, and composed of Saanich grano-diorite bedrock. The three largest islands have a mantle of marine glacial drift upon which thin soils have developed, those in meadow situations being of sandy loam texture. Bedrock exposures are common, and predominate around the shorelines. Shoreline features include a few steep faces, rocky outcrops, boulders, crevices, wave-cut chasms, and small gravel beaches. At least 30 exposed rocky reefs occur in the Chain Islets area. Significant climatic features are frequent strong winds and a cool-summer Mediterranean climate.

BIOTIC FEATURES:

The islands are treeless. The three largest, particularly Great Chain and Alpha, support a fairly continuous herbaceous cover, interrupted occasionally by shrub thickets and bedrock outcrops. Eight vegetation types have been described, their distribution being primarily determined by distance from shore, soil depth, and moisture regime. Shrub stands dominated by baldhip rose and tall Oregon-grape occupy sheltered inland locations. Prominent species in meadows are the great camas, bracken, dune wildrye, fern-leaved desert-parsley, and western buttercup. Also present is a vernal sward dominated by silver and early hairgrass, field chickweed, and clover. Lance-leaved stonecrop, early hairgrass and prickly-pear cactus occur on soil pockets between rock outcrops, and sea plantain, entire-leaved gumweed and thrift are found on rock outcrops receiving salt spray. The lichens Xanthoria candelaria, Parmelia conspersa and Ochrolechia spp. form an association on bare rock. Another Lichen, Haemotoma lapponicum, is very rare. Local sites enriched by river otter and seabird droppings and food remains have distinctive plant species.

Sixty three species of vascular plants have been recorded on Alpha Island, an area of less than 1 ha. Of those, at least 18 are in bloom by mid-April, among them showy stands of camas, golden paintbrush, sea blush and chocolate lily. Many plants listed as rare in British Columbia occur in

2-94B


Maynard Cove
Cadboro Pt
Evans I
48° 27'
BAYNES CHANNEL
Jemmy Jones Island
Fulford Island Reef
Strongtide Islet
Radio Towers 300'
Vantreight Island
Puget Cove
Channel Pt
CHATHAM ISLANDS
IR 4
Radio 204'
Heritage Point
Griffin I
Alpha Islet
Wharf
IR 3
DISCOVERY ISLAND
Pandora Hill
RUDLIN BAY
Sea Bird Point
Commodore Pt
Lewis Reef
Caroline Reef
Great Chain Island
Chain Islets
Spencer Ledge
Virtue Rock
48° 25'
CHANNEL
HECATE PASSAGE
PLUMPER PASSAGE
123° 17'
123° 14'
1000
0
1000 metres

SCALE 1:25 000

N.T.S. No. 92 B/6f

ECOLOGICAL RESERVE No. 94
OAK BAY ISLANDS

the reserve, the more prominent being golden Indian paintbrush (*Castilleja levisecta*), California buttercup (*Ranunculus californicus*), and snakeroot sanicle (*Sanicula arctopoides*).

Intertidal communites are typical of the Victoria area; barnacles, and seaweeds of the genera *Enteromorpha* and *Fucus*, are common. The extensive subtidal area has not been studied, but species occurrence is probably similar to nearby Ten Mile Point (E.R. #66).

Great Chain Island is one of the three largest seabird rookeries in the Gulf of Georgia, recently supporting nearly 200 pairs of double-crested cormorants, 400 of pelagic cormorants, and over 1700 pairs of glaucous-winged gulls. Double-crested cormorants were not known to nest here prior to 1976, and pelagic cormorants have steadily increased from the 70 pairs counted in 1960. A few pigeon guillemots and black oystercatchers also nest. Song sparrows are common land birds, and nest in shrub stands. A variety of marine birds occur seasonally among the reefs and islands. About 50 harbour seals regularly haul out in summer, mainly on the smaller reefs. Mink and river otter occur; other land mammals are apparently absent.

OUTSTANDING FEATURES: The reserve protects natural meadow communities which are of very limited occurrence in British Columbia, have very showy and diverse stands of spring wildflowers, and contain species that are very rare in the province. These meadows, restricted to the Gulf of Georgia area, have been severely disturbed or eliminated in most other locations. Large breeding colonies of cormorants and gulls are present in a location that is convenient for research and interpretation, but also susceptible to disturbance.

OTHER FEATURES: The large shallow-water part of the reserve, punctuated by many reefs, has great potential for marine research and education.

OTHER INFORMATION: Order-in-Council no. 2055, 26 July 1979. Application no. 244. Map no. 92 B/6f. Marine chart 3423. Accessible by boat. Gull population dynamics have been studied on Great Chain Island by staff of the British Columbia Provincial Museum. Reports are available on cormorant surveys at Chain Islands and on the vegetation of Alpha Island. Surveys of marine life are needed. The terrestrial plant communities are sensitive to trampling damage and have a low carrying capacity for recreational use.

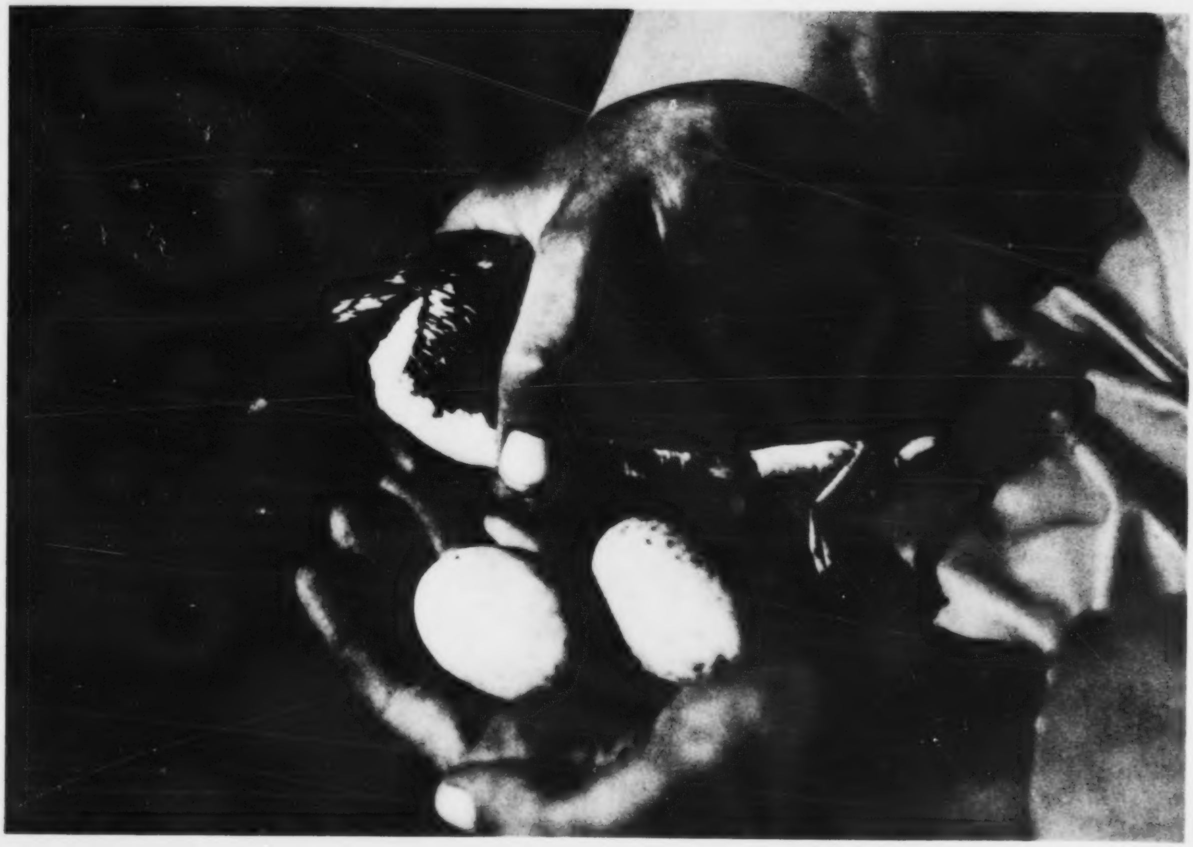


Figure 12. Research in Seabird Colonies

Population surveys and research are conducted in several reserves protecting seabird colonies. Here an ancient murrelet and its clutch are being examined. Ancient murrelets nest in burrows dug in old-growth forests. This species is the chief prey of the rare Peale's peregrine falcon in the Queen Charlotte Islands. (Photo B. Foster)

ANTHONY ISLAND

E.R. #95

PURPOSE: To protect a group of islands that is rich in species diversity of nesting seabirds

LOCATION: Small islands adjacent to Anthony Island Provincial Park, 20 km NW of Cape St. James, W coast of Queen Charlotte Islands

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SIZE: 324 ha LAT: 52°04' - 52°07'N LONG: 131°12' - 131°15'W
ELEVATION: -18 to 34 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

Over 30 islands, islets, and exposed reefs located off the northwest and southwest coasts of Anthony Island are included. They are bounded by the 10 fathom (18 m) contour, resulting in three separate units. Land comprises about 20% of the total area. Thin forest soils and small areas of organic soil occur on the largest islands. Shorelines are much dissected, entirely rocky, with slopes varying from moderate to vertical cliffs. Exposure to surf varies from full to almost none.

BIOTIC FEATURES:

The larger islands support forest cover primarily of Sitka spruce, this often windblown and stunted. Small areas of herbaceous cover occur at the forest perimeter, in sparse tree stands, or on islands of intermediate size supporting no trees.

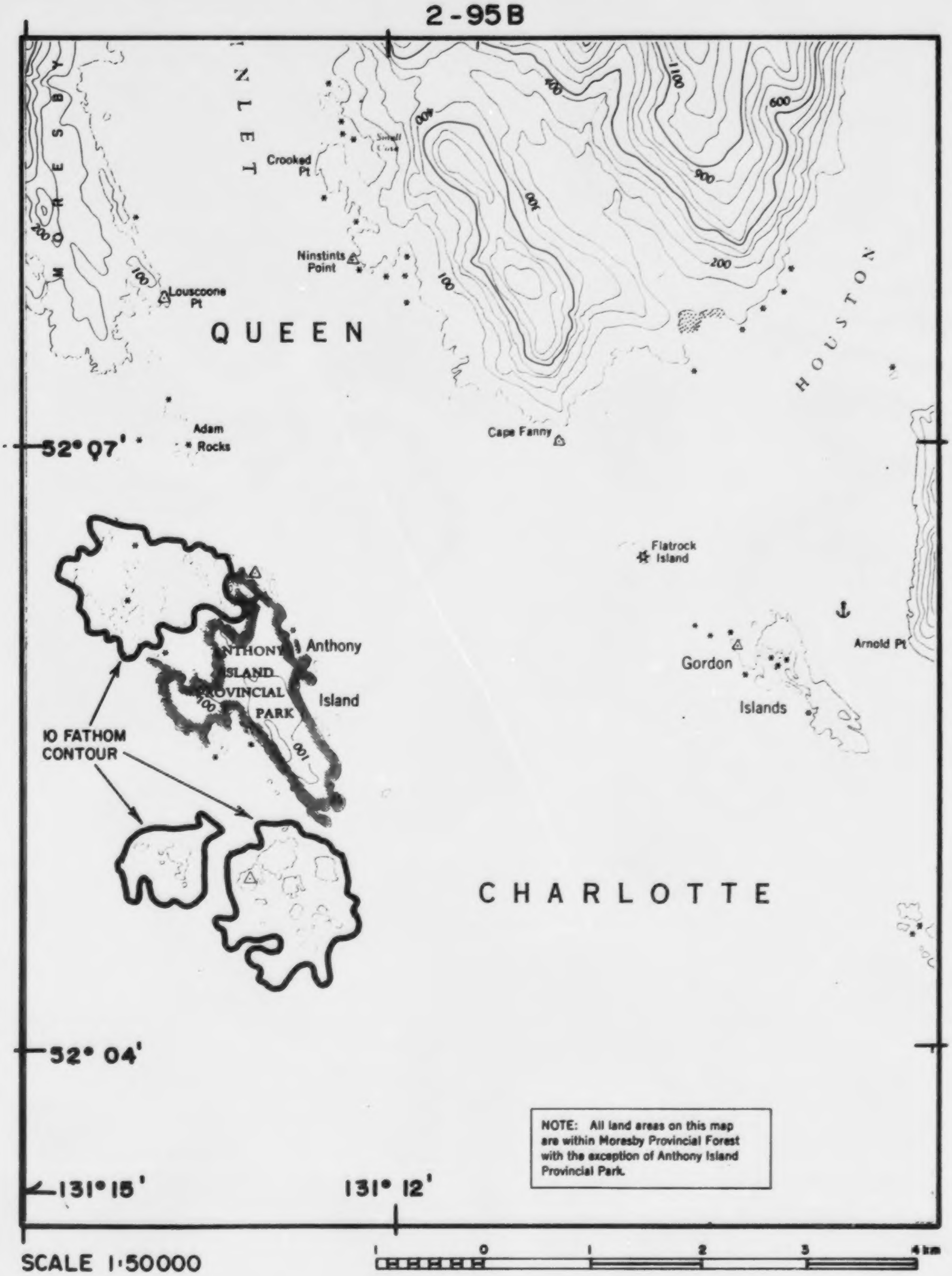
Variations in island size, height, exposure, plant cover, and substrates result in habitats suitable for a variety of nesting seabirds. Consequently, 9 of 13 species which nest on the British Columbia coast are found here, including species which nest in burrows, rock crevices, or in the open on sparse vegetation or bare rock. Leach's storm-petrels (6,000 pairs) and fork-tailed storm-petrels (200 or more pairs) nest in spruce - reedgrass habitat on four of the more exposed islands, while Cassin's auklets (16,000 pairs) nest on 13 islands. Rhinoceros auklets (250 pairs) are known to nest only on one densely forested islet, tufted puffins (50 pairs) on one very steep islet. A few pairs of the uncommon horned puffin nest in the tufted puffin colony. The surface-nesting pelagic cormorant (10 pairs) and glaucous-winged gull (250 pairs) utilize rocky, sparsely vegetated islands; pigeon guillemots (125 pairs) prefer crevices and rock rubble around most of the islands. Black oystercatchers and bald eagles also nest on the islands.

Observations at extremely low tide and during one dive indicate an exception diversity of intertidal and subtidal organisms.

OUTSTANDING FEATURES: The reserve supports a unique diversity of nesting seabirds.

OTHER INFORMATION: Order-in-Council no. 2056, 26 July 1979. Application no. 290. Map no. 103 B/3. Marine chart no. 3825. Accessible by boat.

2-95B


MORESBY
INLET
Crooked Pt
Small Cove
Ninstints Point
Louscoone Pt
QUEEN
Adam Rocks
Cape Fanny
HOUSTON
100
200
400
600
900
1100
52° 07'
Flatrock Island
Anthony Island
ANTHONY ISLAND PROVINCIAL PARK
10 FATHOM CONTOUR
Gordon Islands
Arnold Pt
CHARLOTTE
52° 04'
131° 15'
131° 12'
SCALE 1:50000
1 0 1 2 3 4 km

NOTE: All land areas on this map are within Moresby Provincial Forest with the exception of Anthony Island Provincial Park.

N.T.S. No. 103 B/3

ECOLOGICAL RESERVE No. 95
ANTHONY ISLAND

KEROUARD ISLANDS

E.R. #96

PURPOSE: To protect large colonies of nesting seabirds and breeding Steller sea lions

LOCATION: At Cape St. James, southern tip of Queen Charlotte Islands

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SIZE: 130 ha LAT: 51°55'N LONG: 130°59'W ELEVATION: -37 to 80 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

The reserve consists of a northwest to southeast oriented chain of islands totalling about 30 ha in area, and surrounding subtidal area to the 20 fathom (37 m) bathymetric contour. The reserve has a northern unit containing One Mile Island and Sea Lion Rock and a southern unit enclosing Two Mile Island (actually a group of two islands and nearby rocks) and Southern Rock. These units are 1 km apart. These islands are the southernmost summits of the Queen Charlotte Range, which plunges into the ocean at Cape Saint James. One and Two Mile are high, dome-shaped, moderately indented islands with very steep entirely rocky shorelines. Their perimter is about 80% cliff, the rest being strongly sloping, and their summits support organic soils (Fibrisols) developed by decay of grasses and enriched with bird excrement. Sea Lion and Southern Rocks are somewhat lower, but entirely rocky and with essentially no soil. The maritime climate is characterized by the strongest and most persistent winds in the province, frequent precipitation and fog, and minimal seasonal variation in temperature.

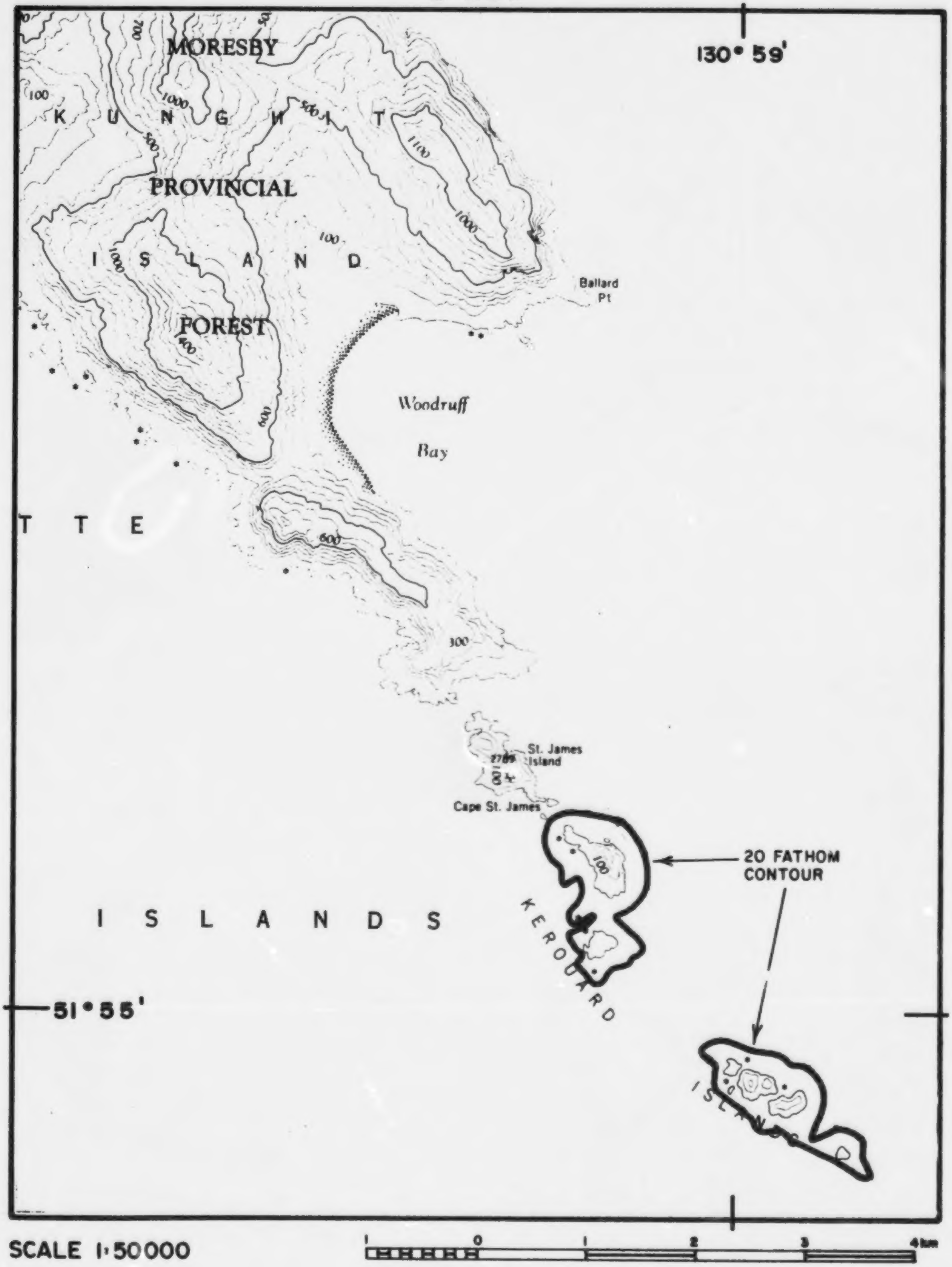
Intertidal substrates are entirely bedrock, typified by many fractures and chasms. Subtidal substrates have not been studied, but much rock is undoubtedly present. The reserve is located at the outer edge of the Continental Shelf. To the west the Continental Slope dropes precipitously to depths of 1800 m and greater, while to the east is the much shallower and near-level seafloor of Hecate Strait. Those seafloor features, the location of the islands at the tip of a large landmass (the Queen Charlotte Islands), plus strong winds, result in frequent upwelling, very strong tidal and wind driven currents, and surf-pounded shorelines.

BIOTIC FEATURES:

The most conspicuous vegetation feature is a continuous mantle of Pacific reedgrass on the summits and upper slopes of the largest islands. These dense, luxuriant stands, up to 2 m in height, contain occasional specimens of Siberian miner's lettuce and common scurvy-grass but little else. Shrubs and trees are absent. A small patch of dune wildrye occurs on Sea Lion Rock, and villous cinquefoil on various rocky slopes. Lichens occur on rock surfaces in the surf spray zone.

Predominant seabirds are those which nest in the moist grassland turf of the largest islands. Those habitats are riddled with the burrows of Cassin's auklet (20,000 - 30,000 pairs) and tufted puffin (about 1500

2-96B


MORESBY
KUNGHIT
PROVINCIAL
ISLAND
FOREST
130° 59'
100
1000
500
1100
Ballard Pt
Woodruff Bay
TTE
600
300
St. James Island
2789
84
Cape St. James
20 FATHOM CONTOUR
ISLANDS
KEROUARD
ISLANDS
51° 55'
1 0 1 2 3 4 km

SCALE 1:50000

N.T.S. No. 102 O/14

ECOLOGICAL RESERVE No. 96
KEROUARD ISLANDS

pairs). This is the largest puffin colony in the Queen Charlotte Islands and third largest in the province. The much rarer horned puffin has also been seen and a few probably nest in the reserve. Seabirds nesting in mainly rocky habitats here are the common murre (only colony in Queen Charlottes, about 50 pairs), pigeon guillemot (25 or more pairs), pelagic cormorant (10 pairs) and glaucous-winged gull (75 pairs). Bald eagles are common, and peregrine falcons are thought to nest on cliffs in the reserve. The islands are located along a significant bird migration corridor, and are the first landfall for many spring migrants moving north from Vancouver Island, including songbirds, shorebirds, and marine species like scoters, shearwaters, and phalaropes.

Kerouard Islands have historically been the largest of three Steller sea-lion breeding rookeries in British Columbia (up to 4,000 animals) but control actions in the early 1960's greatly reduced the population, which now stands at about 1100 in summer, 300 to 400 of which are pups. Sea lions choose ony the most remote, oceanic sites as rookeries, and both pupping and mating occur there. Pupping occurs in June, mating in July, at which time sea lion numbers in the reserve reach their peak. Smaller numbers occur year-round, the typical winter population being 250 to 300 animals. There are two isolated records of sea otters in the reserve. Although a resident population is not believed to occur, habitat potential for this species is very high. Several kinds of whales migrate through or near the reserve, including fin, killer, pygmy sperm, and gray whales.

Surf action, strong tidal currents, and upwelling result in rich and diverse marine life. A variety of brightly colored sponges, algae, sea anemones, and molluscs occur in the intertidal zone. The subtidal part of the reserve has not been studied.

OUTSTANDING FEATURES: The remoteness and physical characteristics of these islands, plus rich marine food resources made available by oceanographic conditions like currents, turbulence and upwelling, provide an outstanding breeding site for sea lions and certain colonial seabirds. This is one of the most remote, wild, and difficult to reach ecological reserves in the entire province.

OTHER INFORMATION: Order-in-Council no. 2057, 26 July 1979. Application no. 278. Map no. 102 O/14. Marine chart no. 3825; 3853. Accessible only by boat, but the weather is seldom good, currents are treacherous, and landing is difficult.

Aside from a small research hut on Sea Lion Rock, the Kerouard Islands show no sign of human impact. In contrast, St. James Island immediately to the north, the site of a lighthouse, meteorological station and residences since 1913, is infested with rats which are known to prey on seabirds and their eggs. It is important that the Kerouards be protected from such a fate.

One graduate research study, on distribution and movements of Stellar sea lion cows at a pupping colony, has been carried out in the reserve. The marine environment needs description.

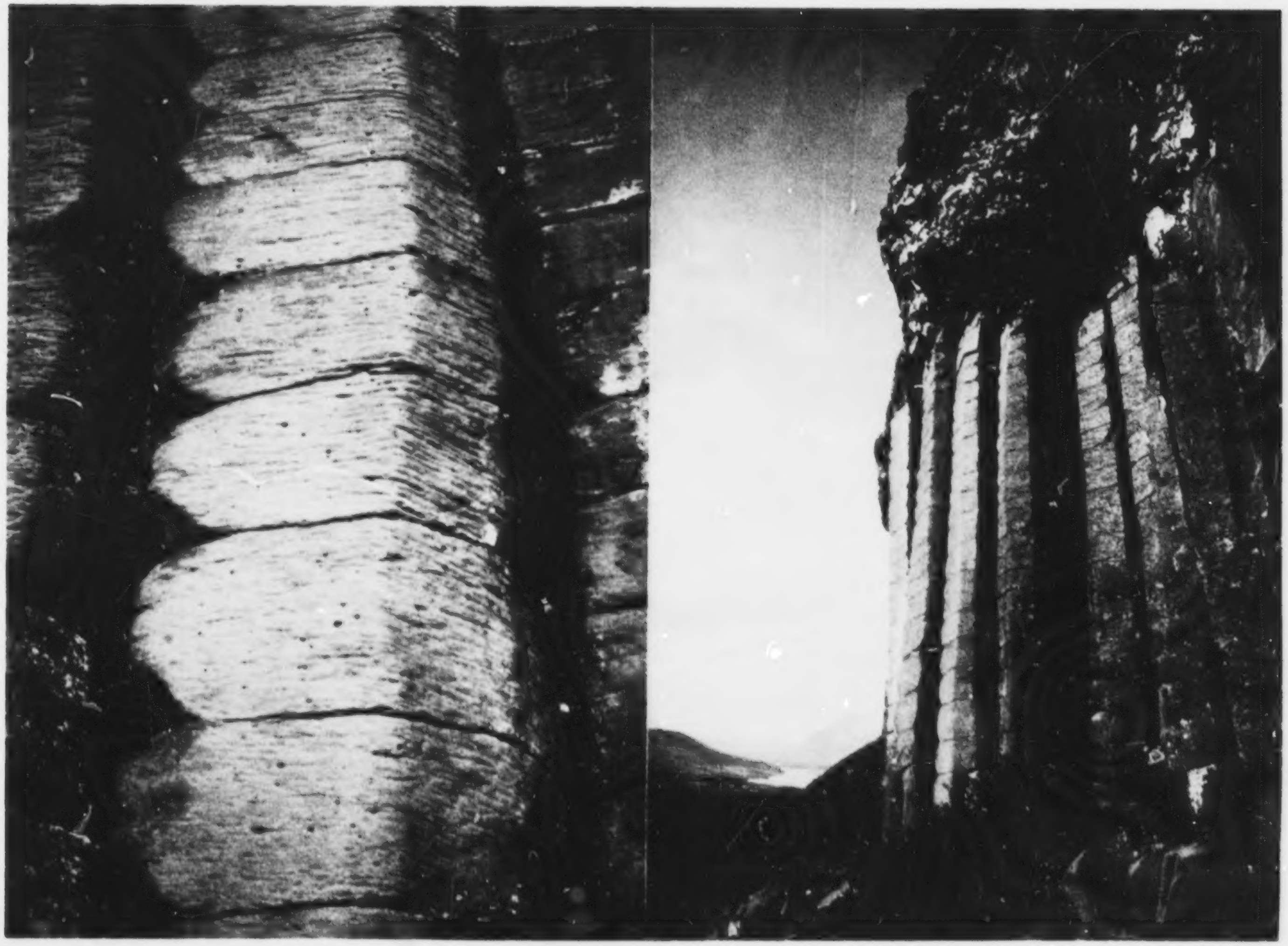
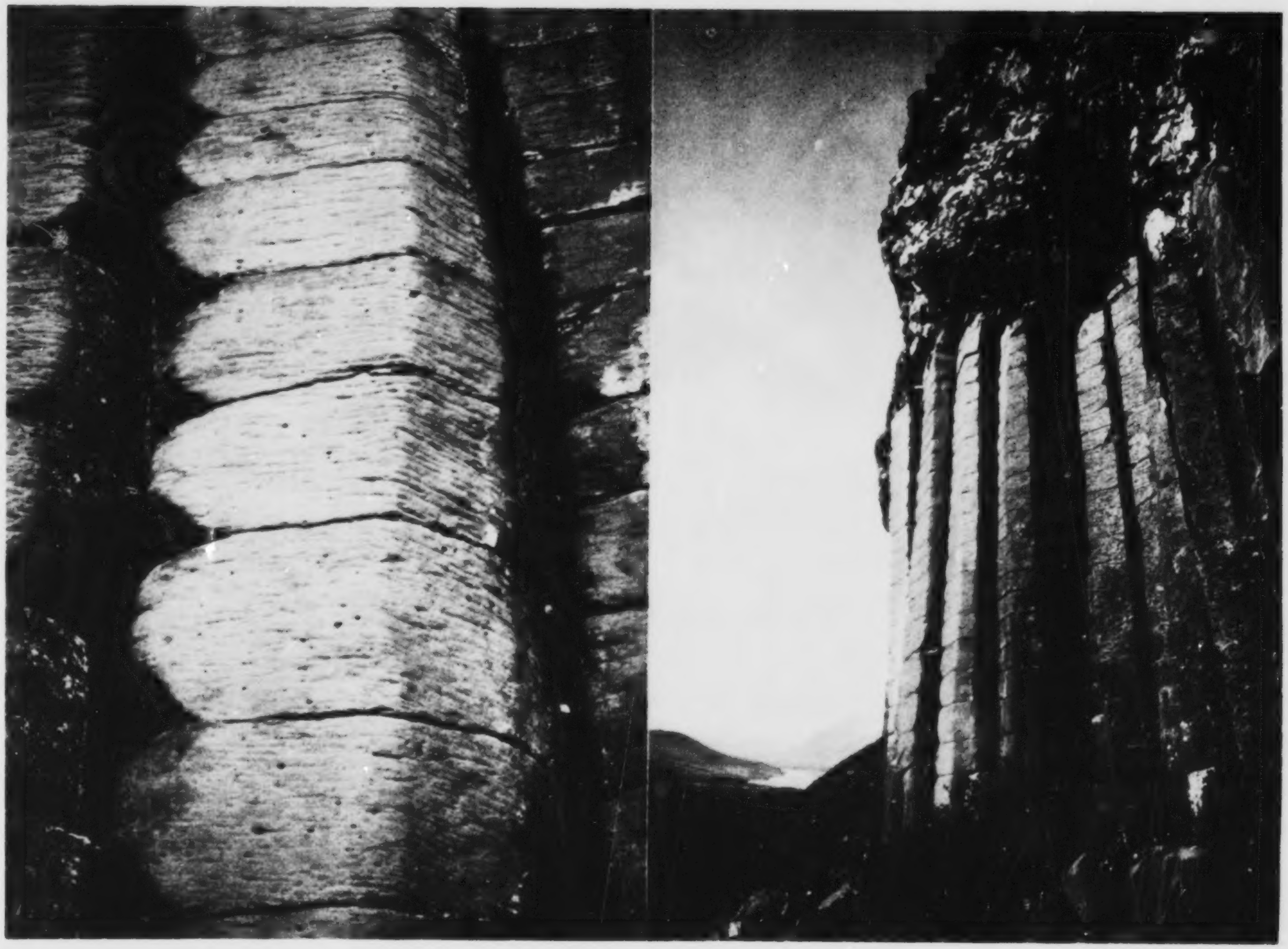


Figure 13. Protection of Outstanding Geological Features in the Cardiff Mountain Ecological Reserve (#55)

One of the purposes of the B.C. Ecological Reserves Act is to protect outstanding or unique biological and geological features. A model case of outstanding geological features is the basalt columns found in the Cardiff Mountain Ecological Reserve (#55). (Photo A. Roberts)



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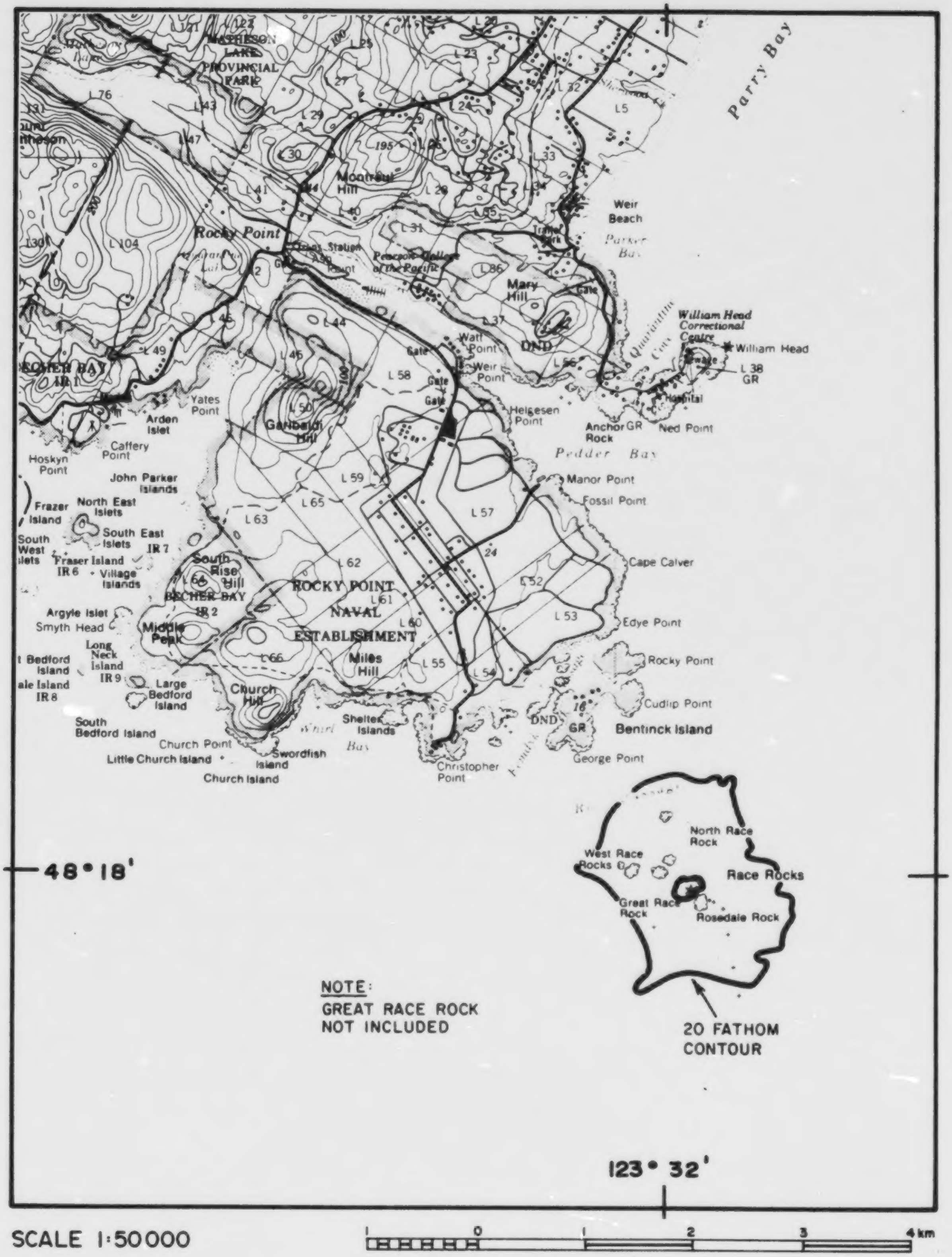

Parry Bay
Matheson Lake Provincial Park
Montreal Hill
Rocky Point
Pearson College of the Pacific
Mary Hill
DND
Weir Beach
Parker Bay
Quarantine Cove
William Head Correctional Centre
William Head
L 38
GR
Hospital
Ned Point
Anchor Rock
Helgesen Point
Pedder Bay
Manor Point
Fossil Point
Watt Point
Weir Point
Gate
Yates Point
Arden Islet
Caffery Point
Hoskyn Point
Becher Bay IR 1
Garibaldi Hill
John Parker Islands
Frazer Island
North East Islets
South East Islets
IR 7
South West Islets
Fraser Island IR 6
Village Islands
South Rise Hill
Becher Bay IR 2
Rocky Point Naval Establishment
Miles Hill
Argyle Islet
Smyth Head
Middle Peak
Long Neck Island IR 9
Bedford Island
Large Bedford Island
IR 8
South Bedford Island
Church Hill
Church Point
Little Church Island
Church Island
Swordfish Island
Shelter Islands
Whirl Bay
Christopher Point
Cape Calver
Edye Point
Rocky Point
Cudlip Point
Bentinck Island
George Point
North Race Rock
West Race Rocks
Race Rocks
Great Race Rock
Rosedale Rock
48° 18'
123° 32'
NOTE:
GREAT RACE ROCK
NOT INCLUDED
20 FATHOM
CONTOUR
1
0
1
2
3
4 km

SCALE 1:50000

N.T.S. No. 92 B/5

ECOLOGICAL RESERVE No. 97
RACE ROCKS

CHILLIWACK RIVER E.R. #98

PURPOSE: To set aside productive floodplain forest stands for purposes of research and stock improvement

LOCATION: Head of Chilliwack Lake, 43 km SE of Chilliwack

SIZE: 86 ha LAT: 49°00'N LONG: 121°25'W ELEVATION: 610 - 760 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

The reserve is in the heart of the Skagit Range of the Cascade Mountains, mostly on the floodplain of the gently flowing, slightly meandering Chilliwack River. The flat valley bottom is about 500 m wide in this area. Soils on alluvial sites are believed to be primarily Regosols, those on the adjacent slopes Podzols.

BIOTIC FEATURES:

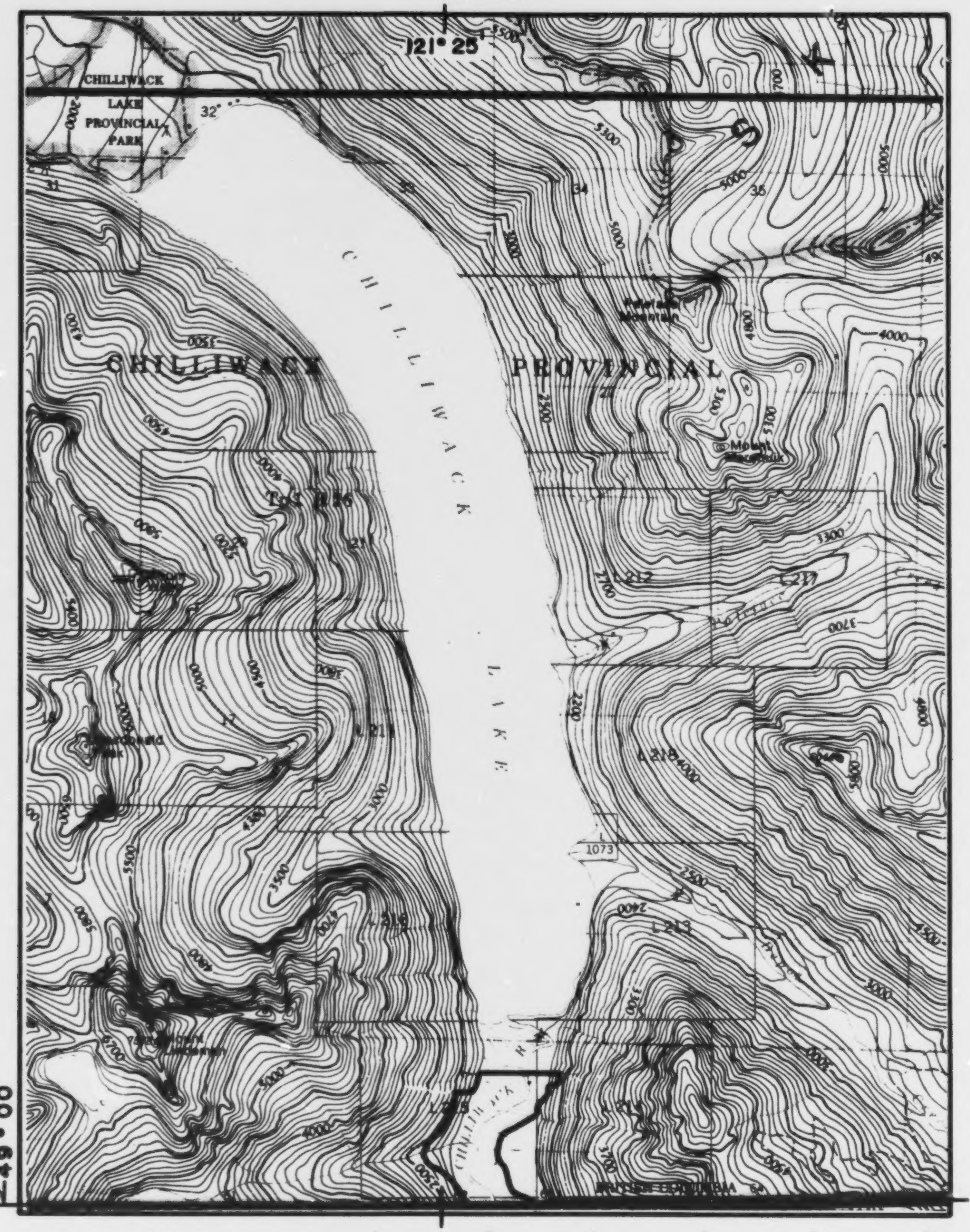
The reserve area is primarily forested with rich old-growth coniferous stands of exceptional growth. A small area of shrubland in the northwest corner is influenced by periodic flooding by Chilliwack Lake, and wetlands occur in the west central area. Three floodplain forest communities have been described. The most recent and most active alluvial sites near the north boundary support mixed forest dominated by black cottonwood, red alder, and western redcedar. Abundant understory shrubs are red-osier dogwood and salmonberry, typical herbs include lady fern and pink wintergreeen. On older, better drained alluvial sites the more extensive western redcedar - western hemlock - vine maple - salmonberry - devil's club - lady fern - moss (Mnium spp), and western hemlock - western redcedar - vine maple - devil's club - oak fern - moss (Hylocomium splendens) communities are present. Cedars may reach 2.75 m in diameter, and true firs 60 m in height. Other trees present include Engelmann spruce, Sitka spruce, grand fir, amabilis fir, Douglas fir, bigleaf maple and Pacific crab apple. This is believed to be an area of hybridization between grand and amabilis fir and between Sitka and Engelmann spruce.

Mammals noted here are the black bear, black-tailed deer, beaver, and porcupine. Typical birds are the winter wren, brown creeper, pileated woodpecker, blue grouse, kinglets and chickadees.

OUTSTANDING FEATURES: This is a site of exceptional tree diversity and growth, and of hybridization between coastal and interior conifers.

OTHER INFORMATION: Order-in-Council no. 699, 27 March 1980. Application no. 255. Map no. 92 H/3. Access by logging road along east side of Chilliwack Lake, or by boat down the lake. A trail passes through the reserve into North Cascade National Park which borders the reserve to the south.

2-98B


121° 25'
CHILLIWACK LAKE PROVINCIAL PARK
CHILLIWACK PROVINCIAL
CHILLIWACK LAKE
1073
BRITISH COLUMBIA
49°00'
1
0
1
2
3
4km

SCALE 1:50 000

N.T.S. No. 92H/3

ECOLOGICAL RESERVE No. 98
CHILLIWACK RIVER

PITT POLDER

E.R. #99

PURPOSE: To preserve a fragment of the rapidly disappearing Fraser Valley boglands

LOCATION: Near S end of Pitt Lake, 15 km NNE of Pitt Meadows

SIZE: 88 ha LAT: 49°19'N LONG: 122°38'W ELEVATION: 2 - 60 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

The reserve is situated near the northern edge of the Fraser Lowland on a large deltaic plain. Surficial materials originated from Pleistocene glaciation, subsequent marine invasion, and finally deposition of river-borne sediments. The Fraser River sediments, which originated as floodplain and overbank deposits of the Fraser and Pitt Rivers, may be up to 15 m thick and overlie up to 300 m of marine silt, sand, and clay. Two bedrock knolls protrude through this material in the reserve.

BIOTIC FEATURES:

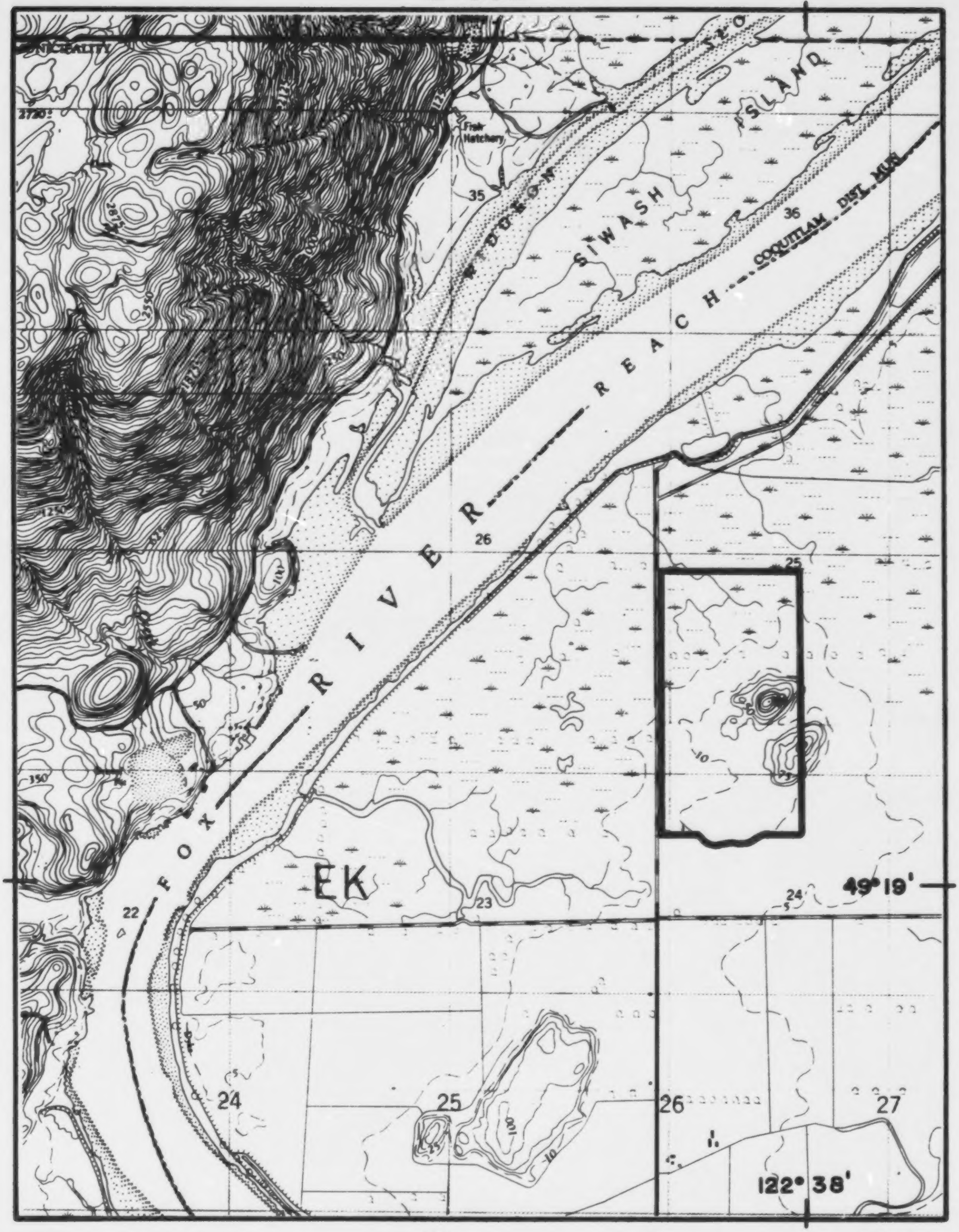
The vegetation varies from open bogland through treed bogland to upland forest and sparse vegetation on rock outcrops. Seven plant communities have been described in this small area. Open boglands, mostly in the northern part of the reserve, are dominated by shrubs of the heath family (Labrador tea, bog-laurel, bog cranberry, and bog blueberry) and sphagnum mosses. A similar type, referred to as bog forest, supports the plants listed above plus lodgepole pine trees. The bogs contain interesting northern relict plants such as cloudberry. Paper birch stands in which hardhack is the dominant shrub and reed canarygrass the dominant grass also occur in boggy sites. On slightly higher ground are lodgepole pine - western hemlock stands with an understory of oval-leaved blueberry, salal, and moss. Two kinds of seral forest resulting from logging and/or fire occupy small areas. These are red alder stands containing juvenile hemlock, salmonberry, bracken, lady fern, and moss, and juvenile Douglas fir woods containing hemlock, red huckleberry, salal, and bracken.

A variety of birds and mammals typical of boglands and seral forest types is present. A few rare greater sandhill cranes are believed to nest in surrounding bogs.

OTHER INFORMATION: Order-in-Council no. 881, 17 April 1980. Application no. 269. Map no. 92 G/7. Access by Neaves Road which boarders the west side of the reserve.

The reserve is located within a large expanse of bogland, but much of this has been altered by cultivation, dyking and drainage. Drainage ditches occur along the north and south boundaries and have lowered the water table in the reserve. This has encouraged the development of lodgepole pine bog forest and the pine-hemlock community.

2-99B


WIDGEON SLO
SIWASH ISLAND
FOX RIVER REACH
COQUITLAM DIST. MUN.
Fish Hatchery
35
36
26
25
22
23
24
EK
49°19'
24
25
26
27
122°38'

SCALE 1:25000

1000 0 1000 metres

N.T.S. No. 92 G/7b

ECOLOGICAL RESERVE No. 99
PITT POLDER

HAYNES' LEASE

E.R. #100

PURPOSE: To preserve a representative natural segment of the most arid ecosystem in British Columbia and Canada

LOCATION: Adjacent to N end of Osoyoos Lake, 6 km NNW of Osoyoos

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SIZE: 101 ha LAT: 49°05'N LONG: 119°31'W ELEVATION: 280 - 610 m

BIOGEOCLIMATIC ZONE: Bunchgrass

PHYSICAL FEATURES:

The reserve lies on the east side of the Okanagan Valley and contains three distinct landforms, the Okanagan River floodplain, gently sloping terraces above the floodplain, and the steep southwestern slopes of Inkaneep (Throne) Mountain. Soils of these landforms are, respectively Gleysols, Chernozems, and Brunisols. Cliffs, talus slopes, prominent glacial fluting and erratic boulders also occur. Except on the floodplain, soils tend to be sandy to gravelly and very well drained. Soil characteristics, aspect, and the rainshadow of the Cascade Mountains combine to make this area the most arid in Canada for plant growth.

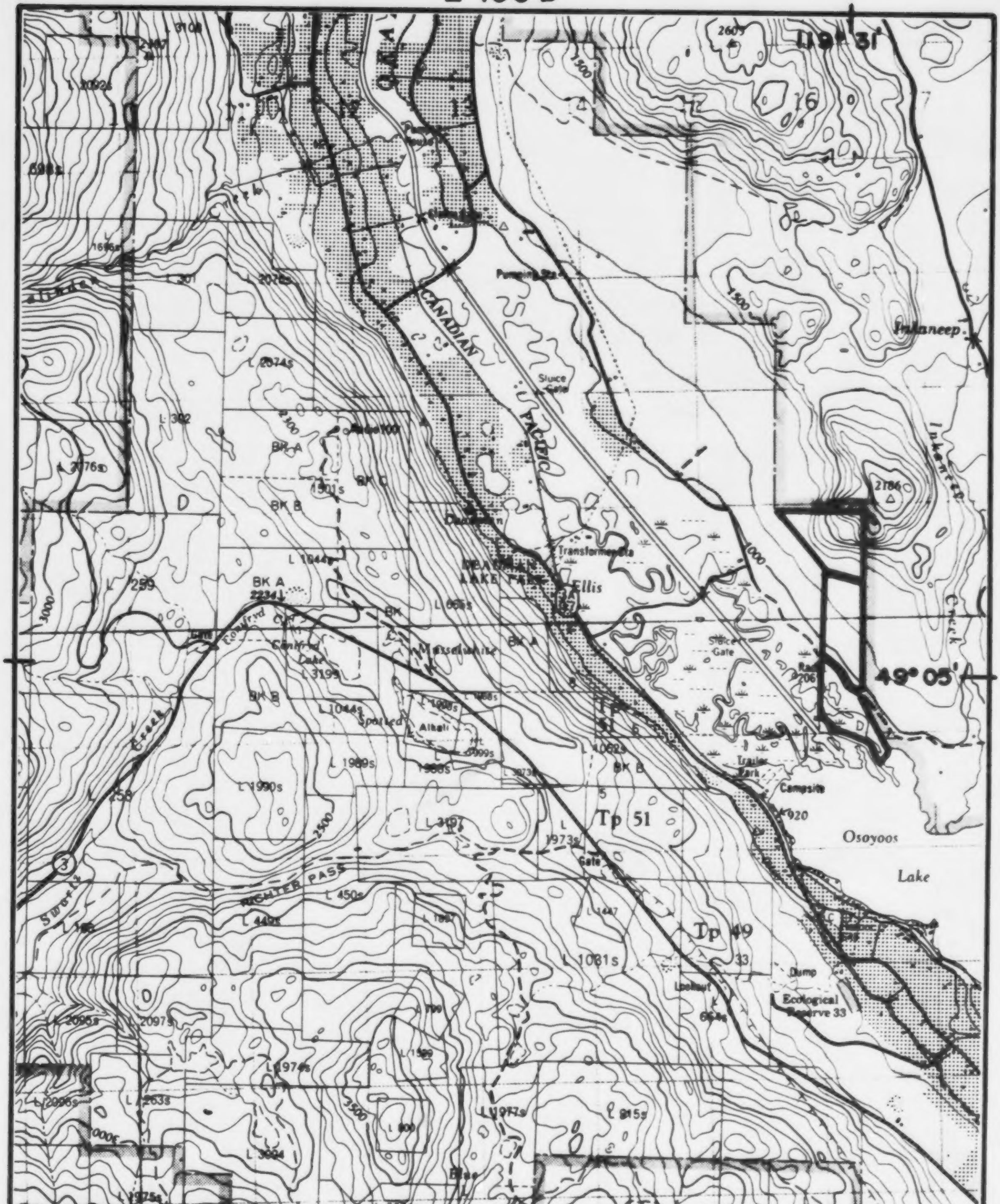
BIOTIC FEATURES:

The reserve is located within a very restricted life zone commonly referred to as the Osoyoos-Arid Biotic Area. This extends as two fingers into British Columbia from the United States, one up the Similkameen Valley to near Keremeos, the other up the Okanagan Valley to Okanagan Falls. Many species of aridland plants and animals occur only in or have their centers of abundance within this narrow, greatly impacted zone and are therefore rare or endangered in both a provincial and national context.

The diversity of habitats here results in 13 identifiable plant communities. Floodplain wetlands support emergent herbaceous associations dominated by either cattail, common reed, or great bulrush, and riparian shrubland dominated by coyote willow, or by water birch - Mackenzie's willow - rose stands. These communities, interspersed with ponds and old river channels, provide nesting habitat for mallards, pintails, blue-winged and cinnamon teal, Canada geese, common snipe, black terns, common yellowthroats, yellow-headed and red-winged black-birds, and marsh wrens. The warm, weedy wetlands are home to largemouth and smallmouth bass and black crappies, fish of very limited distribution in the province.

The sandy terraces which make up the bulk of the reserve support three communities which have been influenced by 100 years of livestock grazing. These are the heavily grazed cheat grass - prickly-pear cactus - sand dropseed type, and the moderately grazed antelope brush - sand dropseed - red three-awn - needlegrass, and ponderosa pine - antelope brush communities. Five communities, mostly of limited extent, have been described on the rocky slopes and summit of Throne Mountain. Shrubby thickets dominated by sumac,

2-100 B


119° 31'
49° 05'
CANADIAN PACIFIC
Osoyoos Lake
Inkaneep
Inkaneep Creek
Ellis
Transformer Sta.
Sluice Gate
Pumping Sta.
Trailer Park
Campsite
Tp 51
Tp 49
Ecological Reserve 33
Dump
Lookout
RICHTER PASS
Spotted
Kruger Mtn Rd
3
Shoal Club

SCALE 1:50 000

1 0 1 2 3 4 km

N.T.S. No. 82 E/4

ECOLOGICAL RESERVE No. 100
HAYNE'S LEASE

poison-ivy and mock-orange occur on talus deposits at the foot of the mountain. Small benches, especially the seat of the "throne" from which the mountain gets its name, are inaccessible to cattle and support essentially pristine communities dominated by bluebunch wheatgrass and alkali bluegrass or ponderosa pine and bluebunch wheatgrass.

Common indicators of heavy grazing in the reserve are cheat grass, prickly-pear cactus, tumble-mustard, Russian thistle, Indian-wheat, low pussytoes, and diffuse knapweed. Showy wildflowers here include long-leaved phlox, death-camas, and shaggy fleabane. About 130 species of vascular plants have been recorded, of which at least 13 are rare in the province.

Typical birds recorded on uplands in the reserve are the meadowlark, eastern and western kingbird, Say's phoebe, vesper sparrow, Savannah sparrow, common flicker, American kestrel, magpie, brown-headed cowbird, rock wren and gray catbird. Rare birds which may occur here include the Canyon wren, sage thrasher and burrowing owl.

Several rare mammals restricted to the South Okanagan, for example the pallid, small-footed, and spotted bats; pocket mouse, harvest mouse, and white-tailed jack rabbit, should occur at least intermittently. A cave used by bats is present on the south face of Throne Mountain. Rattlesnakes occur in rocky sites, and two reptiles of very restricted range in the province, the western skink and short-horned lizard, are expected to be present.

Several noteworthy insects are confined to the arid South Okanagan and should occur in the reserve. Examples include the scorpion *Paruroctonus boreus*, sun-spider *Eremobates gladiolus* and the native mantid *Litoneutria minor*. The reserve harbours two genera of oribatid mites previously unrecorded in Canada and is the type locality for two newly described species.

OUTSTANDING FEATURES: The reserve protects near-natural ecosystems representative of the driest biogeoclimatic subzone in British Columbia and Canada. The zone is very restricted in extent and much disturbed by human activity, therefore this small remnant is of extreme importance. It probably harbours in total, more rare plants, vertebrates, and invertebrates than any other ecological reserve in the province.

OTHER INFORMATION: Order-in-Council no. 2782, 17 December 1980. Application no. 84. Map no. 82 E/4. Access by road from Highway 3A/97.

Channelization of the Okanagan River has influenced natural flooding and wetland communities; upland vegetation has been affected by livestock grazing and weed invasion. Much of the area is now fenced, and some vegetation recovery is expected.

One road and one cattle transit right-of-way cross the reserve.

Reports are available on regional fauna and land capability, and selected features of the reserve (plant list; oribatid mites).

Support from the Okanagan-Similkameen Parks Society was instrumental in obtaining this unique reserve.

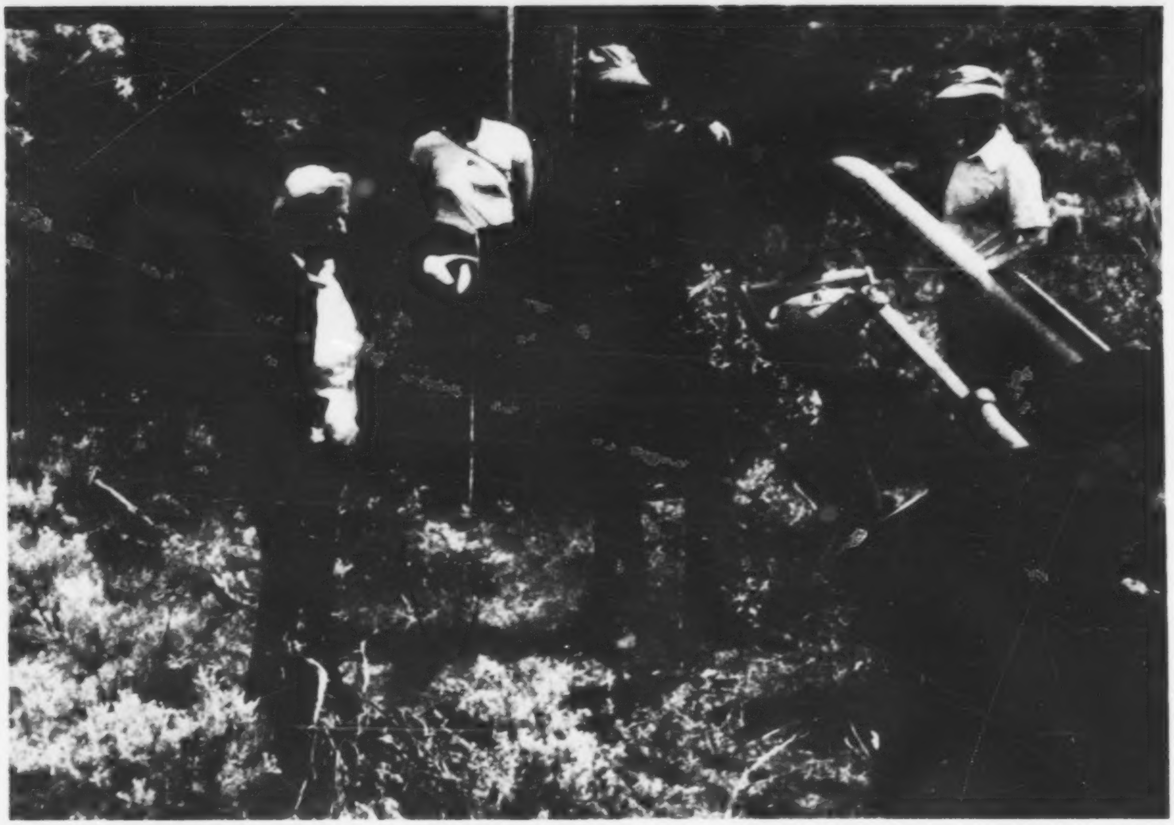


Figure 14. Ecological Reserve Management

The management of ecological reserves aims at protecting the integrity of natural ecosystems. In grassland areas, fencing is often necessary to prevent grazing by livestock. In the Hayne's Lease Reserve (#100), Mr. Harold King (centre) and other naturalists contribute time, equipment and even some materials to fence a precious remnant of the South Okanagan native vegetation. (Photo B. Foster)

DOC ENGLISH BLUFF

E.R. #101

PURPOSE: Conservation of rare plants and cliff-nesting birds associated with limestone cliffs

LOCATION: W bank of Fraser River, 24 km SSW of Williams Lake

SIZE: 52 ha LAT: 51°56'N LONG: 122°16'W ELEVATION: 365 - 700 m

BIOGEOCLIMATIC ZONE: Interior Douglas Fir

PHYSICAL FEATURES:

The reserve encompasses a prominent north-south trending ridge on the west side of the Fraser River. The river here is relatively straight and incised over 500 m below the general level of the Interior Plateau. From its sharp crest 335 m above river level, the ridge slopes at about a 30° angle to a saddle at the west boundary, and precipitously to the river on the east. On the river side, the upper two-thirds of the ridge has largely bare, almost vertical cliffs. These are composed of limestone, and feature several unique caves and sink holes dissolved by running water.

BIOTIC FEATURES:

Steep slopes below the bluffs and around the north end of the ridge support fairly continuous Douglas fir forest. The ridge crest and southern end of the reserve have scattered tree cover.

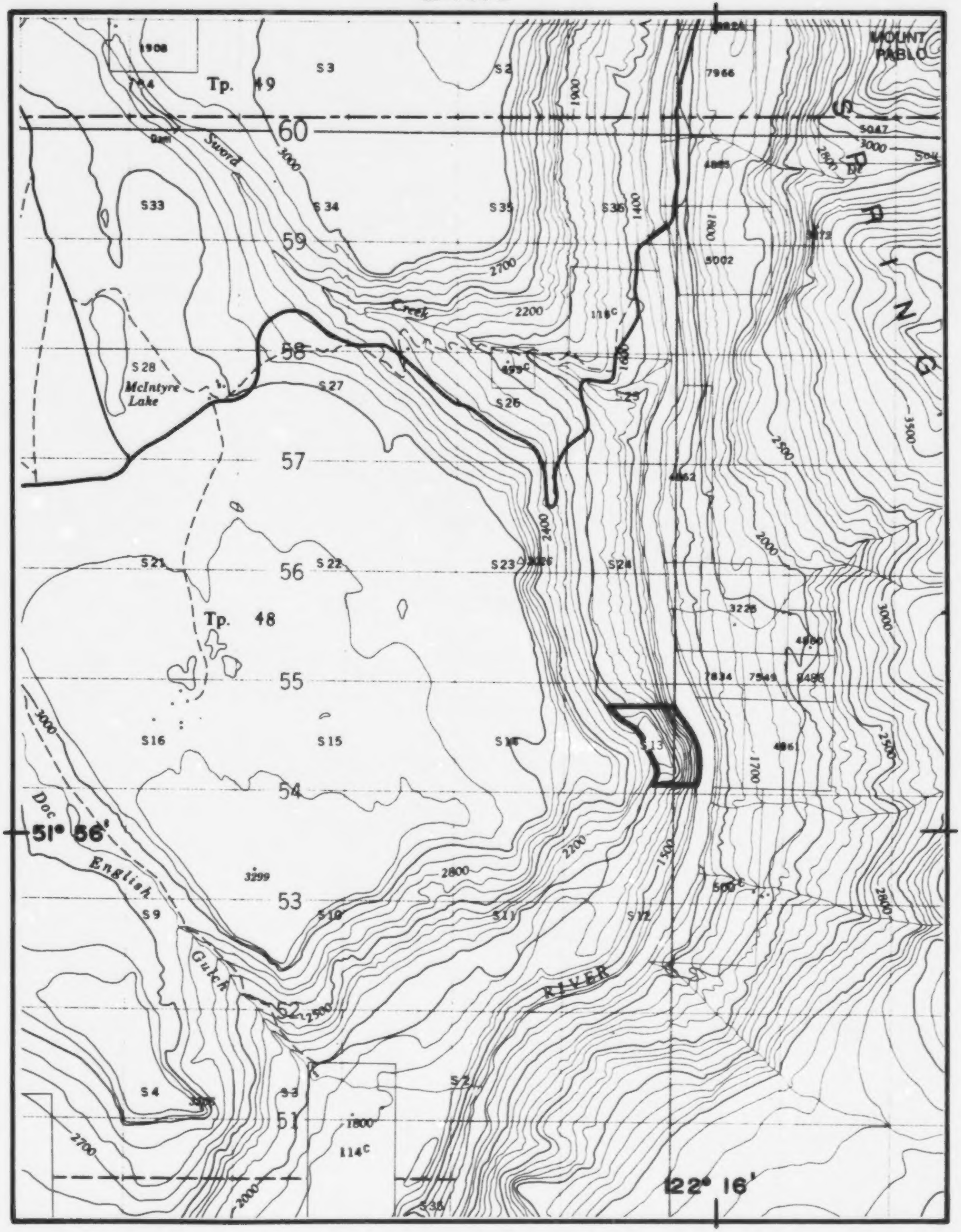
Two Douglas fir communities have been noted. On dry southwest to southeast oriented slopes, Douglas fir trees are well spaced and dominant understory species are Rocky Mountain juniper and bluebunch wheatgrass. In areas with a more continuous tree cover, pinegrass is the most abundant understory plant. A fern community in which Fee's lip fern, Oregon woodsia, Rocky Mountain woodsia, smooth cliff-brake, and fragile fern are constituents occurs among the rocky cliffs. The reserve is noteworthy for its assemblage of limestone-loving or calcicolous plants. Ninety species of vascular plants, 53 lichens and 28 mosses have been recorded here. Rare vascular plants include lotus milk-vetch (Astragalus lotiflorus), Carolina whitlow-grass (Draba reptans), littleseed rice grass (Oryzopsis micrantha), five-leaved cinquefoil (Potentilla quinquefolia), slender lip fern (Cheilanthes feei), and trailing fleabane (Erigeron flagellaris).

Noteworthy avian features include one of Canada's few colonies of white-throated swifts, and a golden eagle nest. Other typical birds here are Say's phoebe, nighthawk, cliff swallow, rock wren, and Townsend's solitaire. California bighorn sheep utilize cliffy areas.

OUTSTANDING FEATURES: Sink holes and caves; rare plants associated with limestone formations; cliff-nesting birds.

OTHER INFORMATION: Order-in-Council no. 725, 19 March 1981. Application no. 284. Map no. 92 O/16. Access via dirt road south from Highway 20. This road forms the western boundary of the reserve.

2-101B


MOUNT PABLO
SPRING
Tp. 49
Tp. 48
Sword Creek
McIntyre Lake
Doc English Gulch
RIVER
51° 56'
122° 16'
60
59
58
57
56
55
54
53
52
51
S13

SCALE 1:50 000

1 0 1 2 3 4 km

N.T.S. No. 92 O/16

ECOLOGICAL RESERVE No. 101
DOC ENGLISH BLUFF

CHARLIE COLE CREEK

E.R. #102

PURPOSE: Preservation of three cold-water mineral springs, associated landforms, and vegetation, on the Kawdy Plateau

LOCATION: Near S end of Teslin Lake, 150 km NW of Dease Lake

SIZE: 162 ha LAT: 59°25'N LONG: 131°55'W ELEVATION: 800 - 900 m

BIOGEOCLIMATIC ZONE: Boreal White and Black Spruce

PHYSICAL FEATURES:

This reserve, the only one located in the Yukon River basin, features three cold-water mineral springs, a rather unique phenomenon in northern British Columbia. Of the three springs, one is most conspicuous, having formed a small, perfectly circular cone elevated about 6.5 m above surrounding terrain and having a water-filled crater about 20 m in diameter. Mineral water bubbles up from the center of the crater, escapes through a narrow break in the rim, and trickles down the west slope of the cone. Below the crater this small stream forms a fan-shaped bog of grey muck. Rock forming the crater is known as "calc-tufa". This is rusty in color, crumbly, light in weight, and is formed by deposition of calcium carbonate on roots and other plant material. Eventual rotting of the plant matter has left the calc-tufa honeycombed and sponge-like.

Two other mineral springs are present but have not formed any cones. They trickle above ground, forming shallow pools with red and yellow encrusted deposits around them for some distance downstream from their sources.

The glacially shaped landforms have subdued, undulating relief with general exposure to the southwest. Drainage is via Charlie Cole Creek into the Teslin River.

BIOTIC FEATURES:

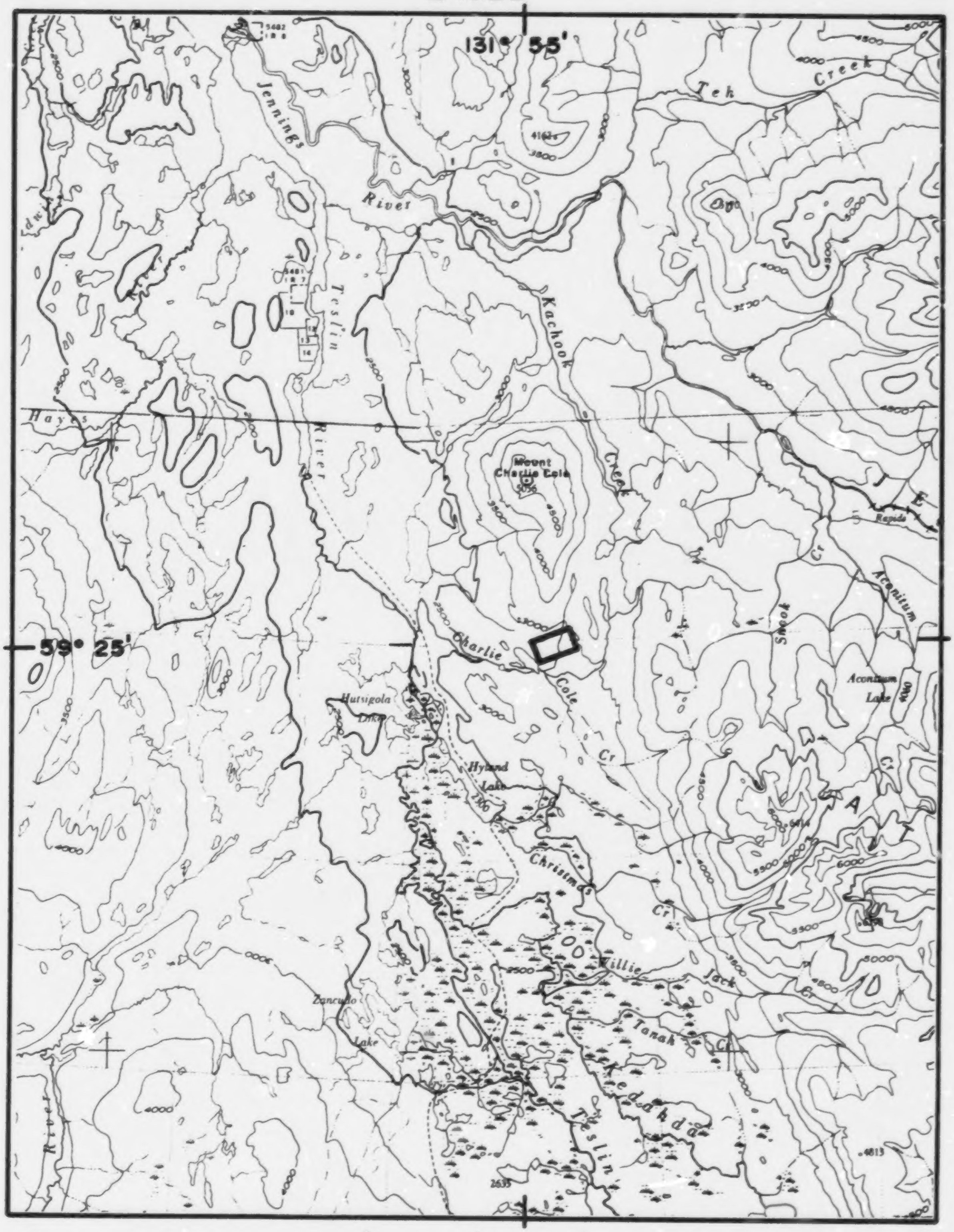
Forest cover is quite sparse, but stands of immature spruce and lodgepole pine, about 15 m tall, occur on high ground in the central part of the reserve. Shrublands dominated by willows and scrub birch cover much of the site, including slopes of the mineral spring cone. Monkey flowers are conspicuous in July along the stream flowing from the crater. The springs are evidently visited by moose, which have heavily browsed local willow stands, especially around the cone.

OUTSTANDING FEATURES: Three cold-water mineral springs, one of which has formed a unique water-filled crater.

OTHER INFORMATION: Order-in-Council no. 875, 9 April 1981. Application no. 247. Map no. 104-O (1:250,000). Access by helicopter, or by boat along Teslin Lake and up Teslin River to Hutsigola Lake, followed by 7 km walk.

The reserve is in a completely natural state.

2-102B


131° 55'
59° 25'
Jennings River
Teslin River
Kachook Creek
Tek Creek
Hayes
Mount Charlie Cole
5056
4163
Charlie Cole Cr.
Hutsigola Lake
Hyland Lake
Christmas Cr.
Willie Jack Cr.
Tanah Cr.
Kedahda
Teslin
Zancudo Lake
Snook Cr.
Aconitum
Aconitum Lake
Rapids
River
2635
4813
SCALE 1:250000
5
0
5
10
15
20 km

N.T.S. No. 104 O

ECOLOGICAL RESERVE No. 102
CHARLIE COLE CREEK

BYERS, CONROY, HARVEY, AND SINNETT ISLANDS E.R. #103

PURPOSE: To protect nesting seabirds, raptorial birds, and marine environments

LOCATION: Off Aristazabal Island, Hecate Strait, 90 km NW of Bella Bella

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SIZE: 12,205 ha LAT: 52°30' - 52°36'N LONG: 129°18' - 129°26'W
ELEVATION: -110 to 50 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

The land area of less than 4% of the reserve total is comprised of four significant islands and many associated islets and reefs, located in four groups. These are the outermost islands of the central mainland coast, located within an area of low relief along the eastern edge of Hecate Strait. Reserve waters are mostly less than 20 m in depth, but reach 110 m in the north.

BIOTIC FEATURES:

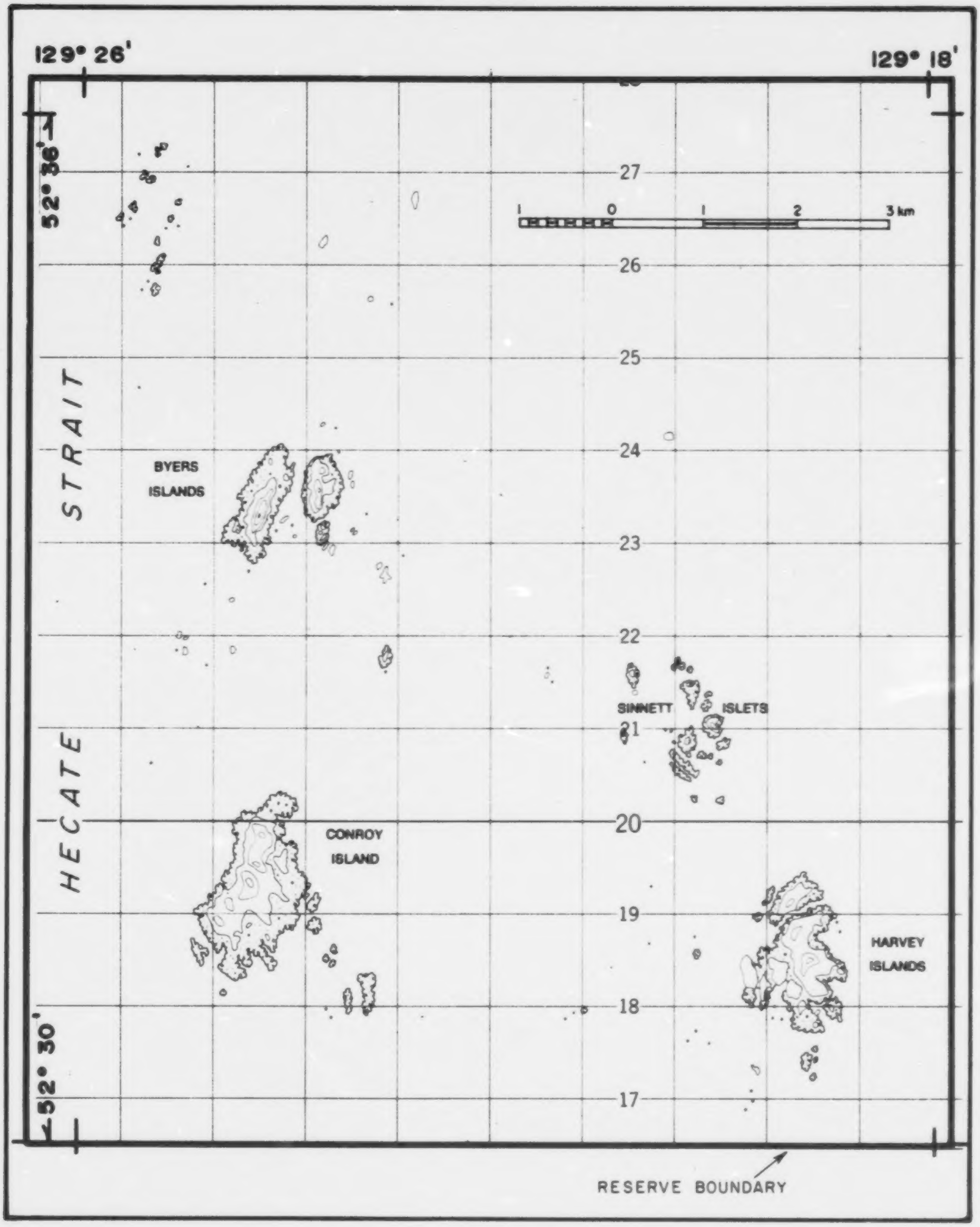
The largest islands support forest cover dominated by Sitka spruce. This covers most of the land area. Small areas of herbaceous meadow, in which cow-parsnip is conspicuous, and windswept grassy headlands, are present. The combination of tidal channels, protected bays, sandy beaches, and rocky intertidal areas provides varied habitat for extensive kelp beds and associated invertebrates.

Eight species of seabirds nest on these islands. An estimated 2000 pairs of Leach's and fork-tailed storm-petrels nest on the forest floor at scattered locations where substrates are suitable for burrowing. In excess of 7000 pairs of Cassin's auklets and 1500 of rhinoceros auklets, also burrow-nesters, utilize open forest and grassy slopes near shoreline. A colony of 50 pairs of tufted puffins, the only significant breeding site along the Mainland Coast, is present on grassy slopes at Byers Island. A population of about 250 pairs of glaucous-winged gulls nest on exposed headlands, while an estimated 50 pairs of black oystercatchers utilize rocky headlands and some beaches as nest sites. At least two pairs of peregrine falcons nest in trees here, the only recent occurrence of such nesting known in North America. Their usual nest sites, steep cliffs, are lacking but food in the form of seabirds is abundant, therefore the falcons have resorted to using old bald eagle nests.

OUTSTANDING FEATURES: A high diversity of nesting seabirds; tree-nesting peregrine falcons; seal pupping habitat.

OTHER INFORMATION: Order-in-Council no. 876, 9 April 1981. Application no. 272. Map no. 103 A/11. Marine chart no. 3726; 3737. Only one brief reconnaissance of these remote islands has been undertaken.

2-103B


129° 26'
129° 18'
52° 36'
52° 30'
27
26
25
24
23
22
21
20
19
18
17
1 0 1 2 3 km
STRAIT
HECATE
BYERS ISLANDS
CONROY ISLAND
SINNETT ISLETS
HARVEY ISLANDS
RESERVE BOUNDARY

SCALE 1:60 000

N.T.S. No. 103 A/11

ECOLOGICAL RESERVE No. 103
BYERS/CONROY/HARVEY/SINNETT ISLANDS

GILNOCKIE CREEK

E.R. #104

PURPOSE: To provide an undisturbed area for silvicultural research on western larch, and a genetic bank for that species

LOCATION: 34 km SSE of Moyie, East Kootenay district

SIZE: 58 ha LAT: 49°01'N LONG: 115°39'W ELEVATION: 990 - 1065 m

BIOGEOCLIMATIC ZONE: Montane Spruce

PHYSICAL FEATURES:

The reserve lies on the relatively flat valley bottom of Gilnockie Creek at its confluence with the Yahk River, which drains southward into Montana. Rounded, forested summits of the Yahk Range (to the west) and McGillivray Range (to the east) mostly rise to the 1700 - 2000 m level. Regional bedrock is largely sedimentary. Soils in the reserve are mostly Brunisols, characteristic of fairly open forest stands.

BIOTIC FEATURES:

Fine, tall stands of mature, relatively disease-free western larch trees are the major feature of this reserve. The best growth by this shade-intolerant species is made on deep, porous, moist soils typical of much of the reserve. Both mature and immature larch stands are present. Tree diversity in the reserve is low, western larch and lodgepole pine providing almost all arboreal cover.

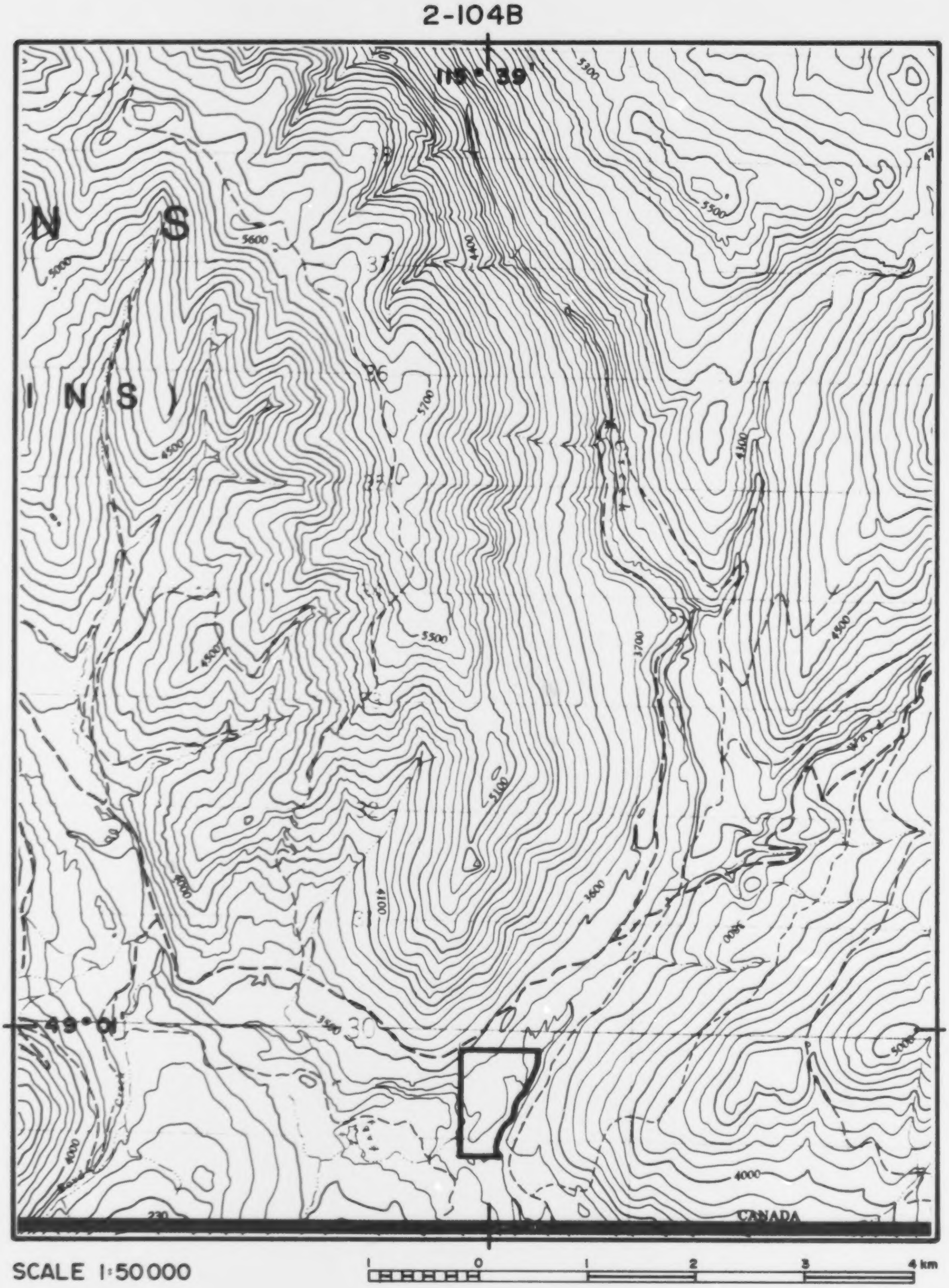
Two communities dominated by western larch occur here and both usually contain some lodgepole pine. In one type the understory dominants are low Oregon-grape, pinegrass, and cow-wheat; in the other soopolallie, common juniper and kinnikinnick are characteristic. Lodgepole pine stands with low Oregon-grape, silky lupine, and pinegrass also occur in small areas. Imperfectly drained sites support juvenile lodgepole pine, mountain alder, red-osier dogwood, and wild sarsaparilla.

Two communities have been described in a centrally located wetland which is surrounded by larch woods. The wettest is dominated by beaked sedge, bulbous water-hemlock, and aquatic mosses; the less saturated area by bluejoint and trailing raspberry. Sweet marsh ragwort (Senecio foetidus), considered a very rare plant in British Columbia, occurs in the wetland.

Moose, elk, white-tailed deer and mule deer occur in this area, and one or the other have heavily browsed willows and Saskatoon. Birds noted in the reserve include the solitary vireo, American kestrel, ruffed grouse, spruce grouse, black-capped chickadee, red crossbill, evening grosbeak, Clark's nutcracker and gray jay.

OUTSTANDING FEATURES: One of few areas in the province where old-growth stands of western larch are preserved.

OTHER INFORMATION: Order-in-Council no. 1531, 9 July 1981. Application no. 301. Map no. 82 G/4. Access by logging road from Highway 3/95 south of Moyie, via Sunrise Creek and Yahk River valleys.


2-104B
115°39'
49°01'
N S
I N S I
5300
5500
5600
5000
4400
5700
4500
4100
5500
3700
4500
5100
4000
4100
3600
3500
4000
4000
5000
CANADA
0
1
2
3
4 km

SCALE 1:50000

N.T.S. No. 82G/4

ECOLOGICAL RESERVE No. 104
GILNOCKIE CREEK

MEGIN RIVER

E.R. #105

PURPOSE: Preservation of alluvial Sitka spruce - western redcedar forest

LOCATION: At mouth of Megin River, Shelter Inlet, 21 km NNW of Tofino

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SIZE: 50 ha LAT: 49°26'N LONG: 126°05'W ELEVATION: 0 - 100 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

The reserve occupies the lower kilometer of the Megin River valley, and mostly consists of level floodplain lands having alluvial surficial materials. Soils developed on these deposits are very rich Regosols. The western side of the reserve encompasses valley slopes above the floodplain. The Megin River, subject to pronounced seasonal variations in flow, has a gravel-cobble bottom, extensive gravel bars along its margins, and many long pools. It has a very low gradient, dropping only 20 m along its 10 km course from Megin Lake to the sea.

BIOTIC FEATURES:

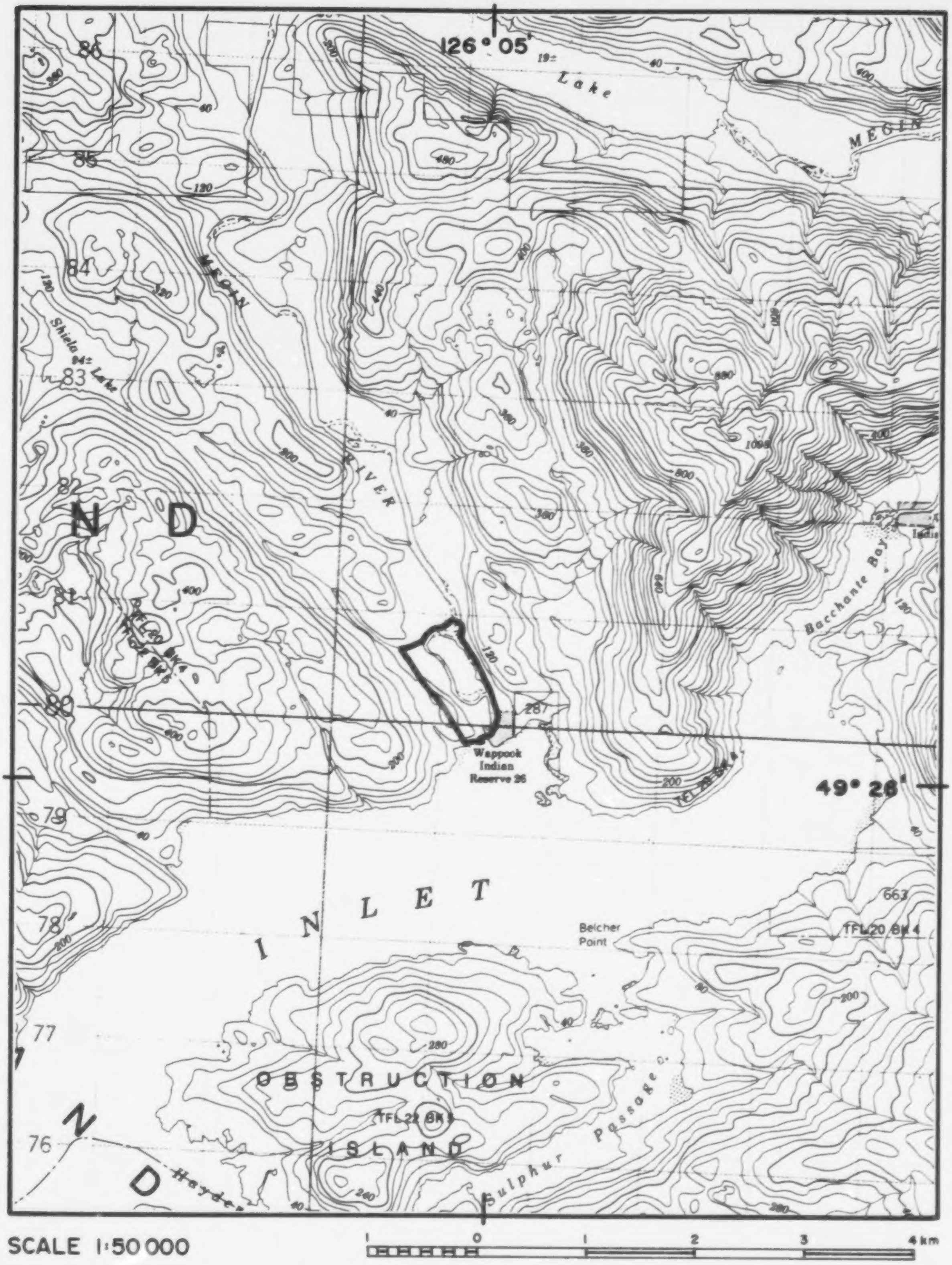
Alluvial lands support old-growth Sitka spruce trees reaching 1.5 m in diameter and 60 m in height, and western redcedars up to 2 m in diameter and 50 m tall. Four plant communiites have been described in the reserve. Tall shrub stands dominated by red alder, willows, and salmonberry occur as riparian strips, between gravel bars and the adjacent forest. The large island and downstream alluvial lands support tall Sitka spruce - western redcedar stands having an understory of salmonberry, red-osier dogwood, devil's club, false bugbane and lady fern. Slopes to the west of the river are dominated by western redcedar - western hemlock forest with an understory of shrubs such as Alaskan blueberry, red huckleberry, and evergreen huckleberry. On the ridge crest aong the west boundary, the forest is dominated by western redcedar and lodgepole pine, and common understory species are salal, fern-leaved goldthread, and sphagnum mosses.

The Megin River system supports significant spawning runs of sockeye, chinook, coho, pink, and chum salmon. Chum salmon, and perhaps other species, spawn within the reserve.

OUTSTANDING FEATURES: A small but excellent old-growth stand of Sitka spruce and western redcedar on a rich alluvial site.

OTHER INFORMATION: Order-in-Council no. 1532, 9 July 1981. Application no. 239. Map no. 92 E/8. Access by boat from Tofino. Proposed logging in the Megin River watershed is expected to profoundly alter the surrounding environment. Although access is difficult at present, the Megin River has potential for canoeing.

2-105B


126° 05'
49° 26'
Lake
MEGIN
MEGIN
RIVER
Shiela 94± Lake
N D
INLET
Wappook Indian Reserve 26
287
Bacchante Bay
Belcher Point
663
TFL 20 BK 4
TFL 22 BK 5
OBSTRUCTION ISLAND
Sulphur Passage
N D
Hayden
1098
86
85
84
83
82
81
80
79
78
77
76
1
0
1
2
3
4 km

SCALE 1:50 000

N.T.S. No. 92 E/8

ECOLOGICAL RESERVE No. 105
MEGIN RIVER

SKAGIT RIVER RHODODENDRONS

E.R. #106

PURPOSE: To preserve stands of the rare Pacific rhododendron in a site unlikely to be disturbed by recreational use

LOCATION: Skagit River Valley, 40 km SE of Hope and 8 km NNW of Ross Lake

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SIZE: 70 ha LAT: 49°04'N LONG: 121°08'W ELEVATION: 525 - 1125 m

BIOGEOCLIMATIC ZONES: Coastal Western Hemlock; Interior Douglas Fir

PHYSICAL FEATURES:

The reserve consists of two blocks, the lowermost on the gently sloping fan of St. Alice Creek on the floor of the Skagit Valley, the upper block on northeast oriented mountain slopes between St. Alice and McNaught Creeks. Surficial materials between bedrock outcrops on the steep slopes are colluvium and till; those on the old creek fan are of glacio-fluvial origin.

BIOTIC FEATURES:

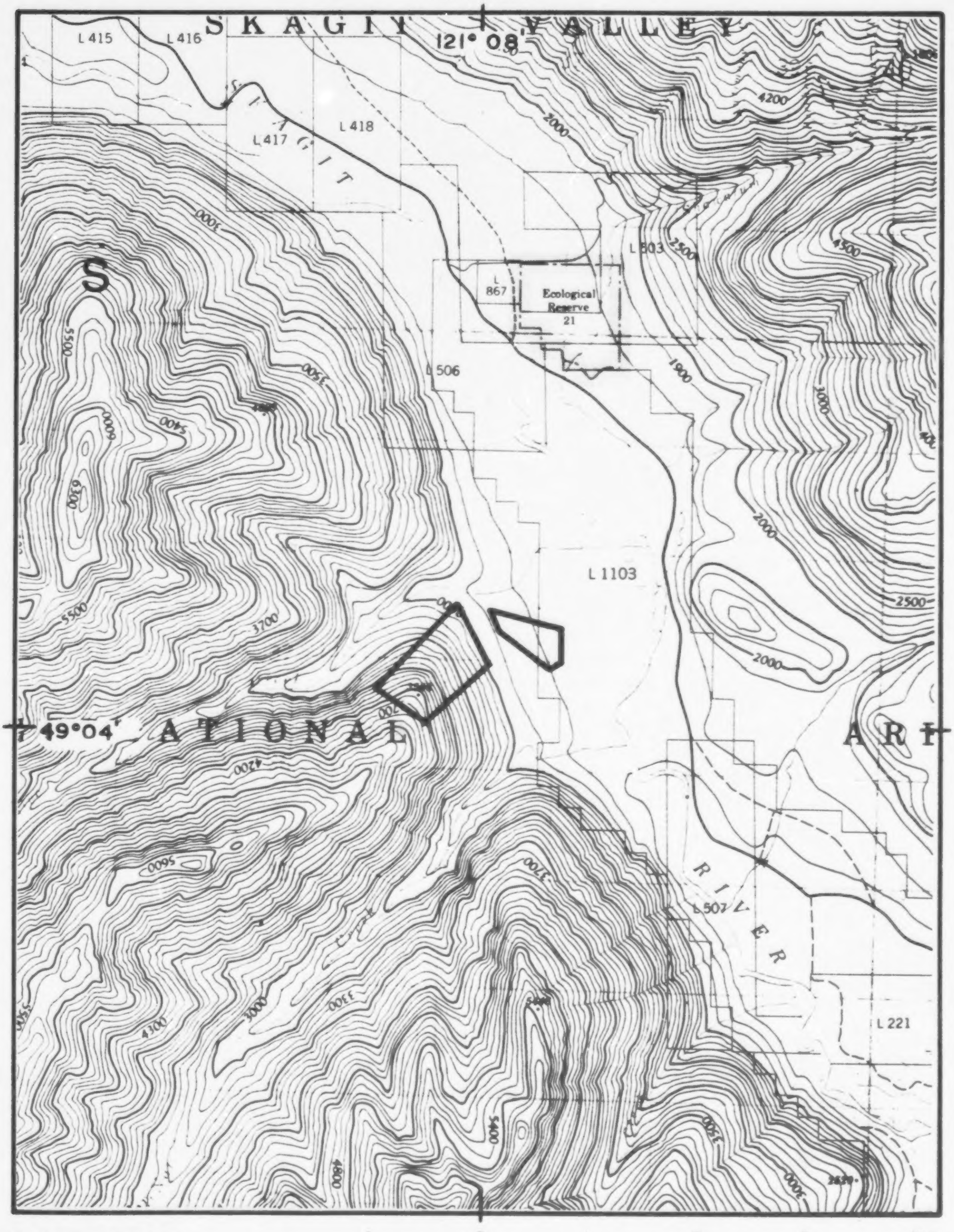
The most significant feature is a large population of the showy, pink-flowered, Pacific rhododendron (Rhododendron macrophyllum) a rare plant which in British Columbia is restricted to the Skagit River watershed, possibly the Chilliwack River valley, and two small sites on Vancouver Island. Its characteristic habitat is shaded evergreen forest on dry gravelly terraces.

Rhododendrons in the reserve are growing in two quite different habitats. The lower block contains typical habitat, predominantly Douglas fir and lodgepole pine forest on strongly-drained alluvial and floodplain deposits. Western hemlock and western redcedar occur as sub-dominant trees; Pacific rhododendron, falsebox, and Oregon-grape are abundant shrubs; the mosses Rhytidiadelphus loreus and Hylocomium splendens provide extensive ground cover. In the upper, steeper, block, the forest is dominated by western hemlock and western redcedar, and Douglas fir is less common. Dominant understory shrubs are red huckleberry, falsebox, Oregon-grape, and Pacific rhododendron, although the latter is restricted to open forest stands near rock outcrops. Seedlings and older specimens of rhododendron are present in both blocks of the reserve. Rhododendrons in this area appear to be associated with sites having a history of forest fire.

OUTSTANDING FEATURES: Excellent stands, including seedlings, of the Pacific rhododenron, a species of very restricted range in British Columbia.

OTHER INFORMATION: Order-in-Council no. 2318, 12 November 1981. Application no. 252. Map no. 92 H/3. The reserve is in the Skagit Valley Recreation Area. Access only by foot from the Silver-Skagit Road which is about 1 km away. This involves crossing the Skagit River.

2-106B


SKAGIT VALLEY
121° 08'
L 415
L 416
L 417
L 418
SKAGIT
L 503
L 867
Ecological Reserve 21
L 506
L 1103
L 507
RIVER
L 221
49°04'
S
ATIONAL
ARI
1000
2000
2500
4200
4500
3500
5500
6000
6300
5400
3700
2000
1900
3000
4200
5600
3700
3000
3300
4300
3400
4800
3500
3000
0
1
2
3
4 km

SCALE 1:50000

N.T.S. No. 92 H/3

ECOLOGICAL RESERVE No. 106
SKAGIT RIVER RHODODENDRONS

CHUNAMON CREEK E.R. #107

PURPOSE: To establish a research area containing Sub-boreal Spruce and Engelmann Spruce - Subalpine Fir ecosystems

LOCATION: Butler Range, W of Williston Lake, 54 km NNE of Germansen Landing

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SIZE: 344 ha LAT: 56°13'N LONG: 124°27'W ELEVATION: 875 - 1500 m

BIOGEOCLIMATIC ZONES: Sub-Boreal Spruce; Engelmann Spruce - Subalpine Fir

PHYSICAL FEATURES:

From its western boundary along the summit of the Butler Range at the 1500 m elevation the reserve slopes moderately to the northeast for nearly 3 km, to its base at the 875 m level. Average slope is 10 - 15°. Shallow valleys have been incised by two small streams whose entire headwaters are within the reserve. The entire reserve is soil-covered.

BIOTIC FEATURES:

This gently sloping site is entirely clothed with relatively mature, dense stands of conifer forest. Despite an elevational range of only 625 m, a complete transition from typical white spruce-dominated Sub-Boreal Spruce forest to subalpine fir-dominated Engelmann Spruce - Subalpine Fir forest is evident. Growing sites range from good at low elevations through medium at mid-slope to poor at upper levels. On good sites the white spruce stands, about 135 years old, reach 37 m in height.

Two associations have been described in the Sub-Boreal Spruce Zone. These are the white spruce - black huckleberry - bunchberry - moss type, and the white spruce - subalpine fir - oak fern - moss type.

Three associations have been noted in the subalpine zone. The lowermost, in which Engelmann spruce is dominant and subalpine fir sub-dominant, is identified by its understory of oval-leaved blueberry, oak fern, and mosses. Subalpine fir is the most abundant tree in forests above the 1250 m level, where subalpine fir - lodgepole pine - black huckleberry - moss, and subalpine fir - Englemann spruce - bunchberry - queen's cup - moss types are present.

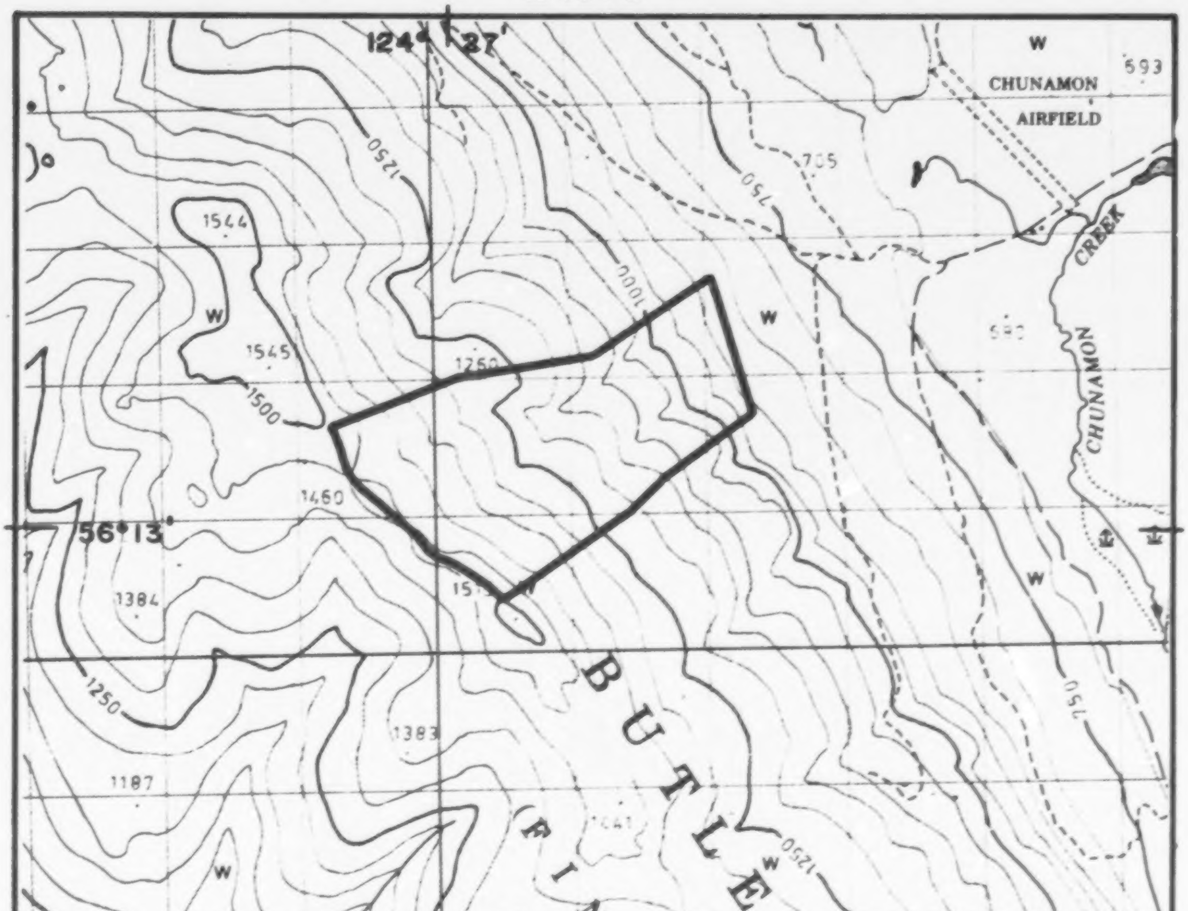
Widely scattered trembling aspen and paper birch trees occur. White-flowered rhododendron is near the northeastern limit of its range in this reserve.

The fauna has not been described but species typical of climax conifer forests, for example marten, red squirrel, red-backed vole, spruce grouse, gray jay, and northern junco should be common.

OUTSTANDING FEATURES: Excellent site to study growth of northern spruce stands and to monitor hydrology of northern forest streams.

OTHER INFORMATION: Order-in-Council no. 2357, 20 November 1981. Application no. 220. Map no. 94 C/1. Access via logging roads from Raspberry Harbour. Logging has occurred around parts of the reserve.

2-107B


124° 27'
56°13'
CHUNAMON AIRFIELD
CHUNAMON CREEK
BUTLER RANGE
FINLAY RANGES
MESHINKA
593
705
590
1544
1545
1500
1460
1260
1250
1000
750
1384
1383
1187
1441
1389
1422
1236
792
1457
1292
1393
1424
880
819
957
W
0
1
2
3
4 km

SCALE 1:50000

N.T.S. No. 94 C/1

ECOLOGICAL RESERVE No. 107
CHUNAMON CREEK

COUGAR CANYON

E.R. #108

PURPOSE: To preserve representative Interior Douglas Fir ecosystems, together with a chain of small lakes and associated wetlands

LOCATION: 13 km S of Vernon, E of Kalamalka Lake

SIZE: 550 ha LAT: 50°09'N LONG: 119°19'W ELEVATION: 450 - 870 m

BIOGEOCLIMATIC ZONE: Interior Douglas Fir

PHYSICAL FEATURES:

The reserve lies on the moderately rugged western slopes of the Grizzly Hills. The major physical feature is a narrow, relatively straight, sometimes canyon-like valley the length of the reserve. This appears to be a structural fault further eroded by glacial meltwater. A chain of six elongate lakes, two of which have three basins separated by wetlands, lie in the canyon bottom. Drainage through them is to the south. The valley bottom is narrow and steep cliffs occur on both sides of some lakes.

BIOTIC FEATURES:

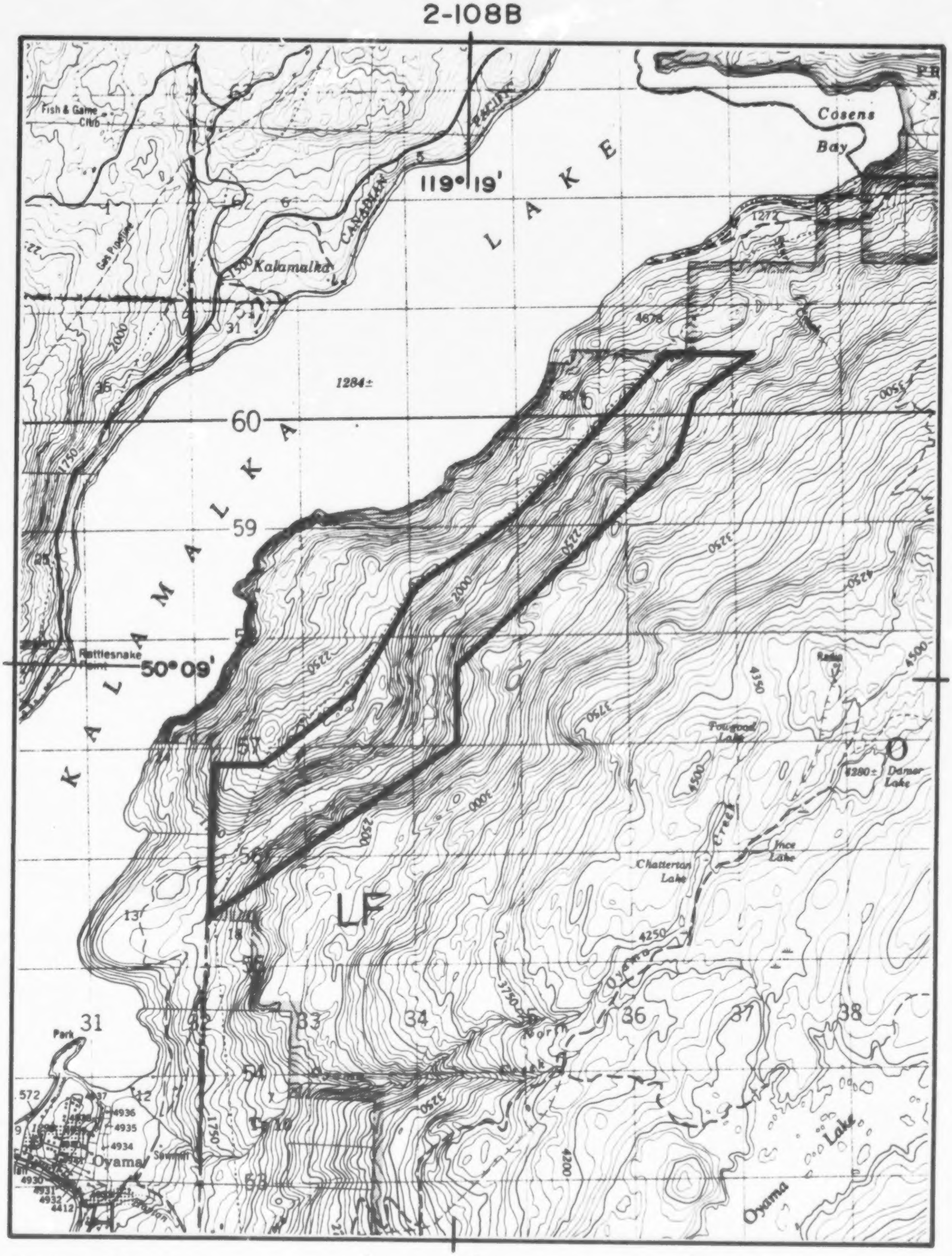
Coniferous forest covers most of the reserve. Small areas dominated by ponderosa pine, sumac and bluebunch wheatgrass occur on south-facing slopes at the south end of the reserve. Mixed stands of Douglas fir and ponderosa pine cover most of the remaining area. Common understory species on southern exposures are common and Rocky Mountain juniper, kinnikinnick, arrow-leaved balsam-root, bluebunch wheatgrass, and Wallace's selaginella. Soopolallie, falsebox and pinegrass are abundant on north-facing slopes. Trembling aspen and Douglas maple occur in moist draws. Pondweed communities occur in the lakes, and cattail - bulrush stands between several lakes. Small areas dominated by paper birch, western redcedar, or a mixture of these occur in the valley bottom. Fifty eight species of lichens, 9 liverworts, 47 mosses, 84 fungi and 318 vascular plants have been recorded.

Fifty six species of birds have been noted. Ring-necked and mallard ducks and Canada geese nest at the lakes. Mammals include mule and white-tailed deer, black bear, beaver, muskrat, coyote, red squirrel, chipmunk, and voles. Interesting reptiles here are the northern alligator lizard, western blue racer, rattlesnake, and painted turtle.

OUTSTANDING FEATURES: A variety of habitats, from ponderosa pine - bunchgrass to redcedar - skunk cabbage types, within a small area.

OTHER INFORMATION: Order-in-Council no. 2565, 10 December 1981. Application no. 102. Map no. 82 L/3. Vehicular access south from Cousins Bay or north from Oyama on four-wheel-drive track which follows transmission line right-of-way along west boundary. Permission is needed to cross gated private or leased land north and south of the reserve.

A comprehensive natural history report is available.


2-108B
119° 19'
50° 09'
KALAMALKA LAKE
Cosens Bay
Kalamalka
Fish & Game Club
Gas Pipeline
CANADIAN PACIFIC
Rattlesnake Point
1284±
60
59
57
56
LF
31
32
33
34
36
37
38
54
53
Park
Oyama
Toogood Lake
Chatterton Lake
Ince Lake
Damer Lake
Oyama Lake
Oyama Creek
North
Radio
4280±
1750
2000
2250
3000
3250
3750
4250
4350
4500
4676
0
1
2
3
4 km

SCALE 1:50000

N.T.S. No. 82 L/3

ECOLOGICAL RESERVE No. 108
COUGAR CREEK

CHECLESET BAY

E.R. #109

PURPOSE: To provide sufficient high-quality marine habitat for a re-introduced population of sea otters to increase their range and abundance to the point that they are no longer endangered

LOCATION: Between Kyuquot and the Brooks Peninsula, W coast of Vancouver Island

---

SIZE: 34,650 ha LAT: 50°00' - 50°09'N LONG: 127°25' - 127°50'W
ELEVATION: -450 to 80 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

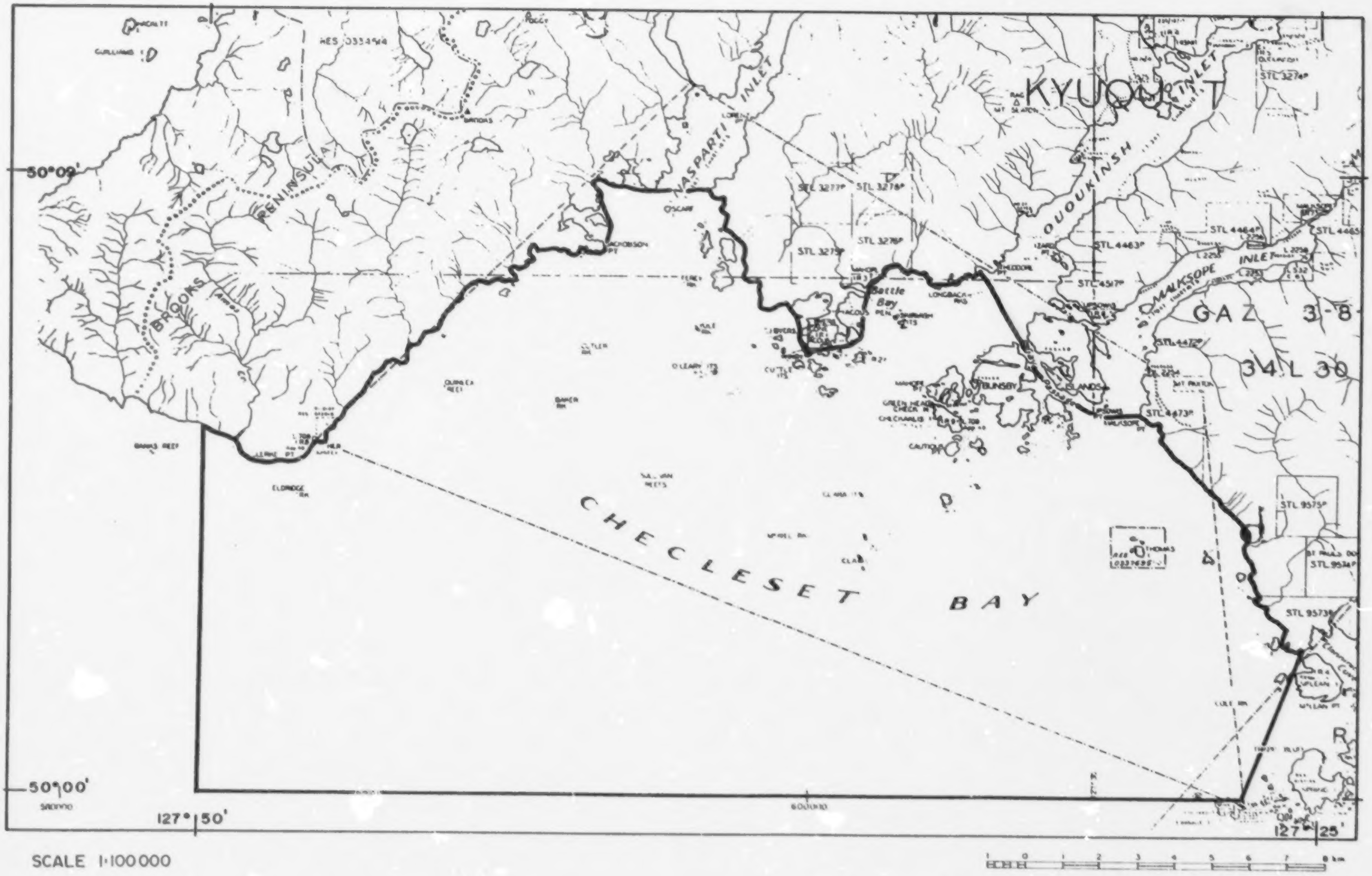
PHYSICAL FEATURES:

The reserve is 30 km in east-west extent. Over 98% of its area is marine, the rest consisting of about 40 islands from under 1 ha to 240 ha in size. The northern boundary includes 40 km of Vancouver Island shoreline which, except where protected by islands, is a rocky, high-energy environment. However, a few small estuaries and pocket beaches occur along the Brooks Peninsula shoreline. The largest islands are near shore. These have rocky, indented shorelines, but sheltered areas among them support soft bottom communities. Low cliffs, sea stacks, arches, and caves are fairly common coastal features. Small islands and reefs occur offshore for 6 to 8 km and their outer tier, a chain parallel to the coastline, is aptly named the Barrier Islands. These receive the full brunt of Pacific surf. Between the major groups of reefs, and seaward from them, the Continental Shelf seafloor is quite smooth, with a gentle slope to the southwest. Inshore from the outermost reefs the water depth is generally under 45 m except for northeast-southwest troughs excavated by Pleistocene glaciers which flowed from three fjords located to the northwest. Seaward from the outermost reefs the ocean floor drops gradually to 90 m and then plunges abruptly to 450 m at the extreme southwest corner of the reserve.

BIOTIC FEATURES:

The larger islands support forest cover dominated by Sitka spruce, including a spruce-western hemlock-salmonberry-sword fern association, and a spruce-salal-false lily-of-the-valley - moss association. Western redcedar and red alder occur.

Seabirds nest at three locations in the reserve, Thomas Island and nearby reefs; the outer Bunsby-Clara area; and O'Leary-Cuttle-Yule Islets. Estimated breeding pairs are 50 fork-tailed storm-petrels, 1200 Leach's storm-petrels, 80 pelagic cormorants, 380 glaucous-winged gulls and 50 pigeon guillemots. Black oystercatchers breed on several reefs. Bald eagles nest at Bunsby and Thomas Islands, and probably elsewhere. A variety of land birds, including band-tailed pigeons and ruffed grouse, have been recorded on Bunsby Islands, and many feeding or transient seabirds on surrounding waters. Land mammals on one or more of the Bunsby Group are the dusky shrew, Townsend vole, deer mouse, red squirrel, raccoon, mink, black


KYUQUOT
QUOUKINSH INLET
MALKSOPE INLET
NASPARTI INLET
BROOKS PENINSULA
CHECLESET BAY
Battle Bay
Bunsby
GAZ 3-8
34 L 30
STL 3277P
STL 3276P
STL 3275P
STL 4464P
STL 4463P
STL 4465
STL 4517P
STL 4472P
STL 4473P
STL 9575P
STL 9574P
STL 9573P
HES 0334414
50°09'
50°00'
127°50'
127°25'
600000
0 1 2 3 4 5 6 7 8 km

SCALE 1:100000

R.M. 92 L/SW

ECOLOGICAL RESERVE No. 109
CHECLESET BAY

bear, and black-tailed deer. None have evolved endemic forms. Western toads, clouded salamanders, and northwestern garter snakes also occur.

Eighty nine sea otters, (Enhydra lutris) previously extinct in Canadian waters, were introduced to Checleset Bay from Alaska over the period 1969-1972. By 1984 these had increased to at least 345 animals of which about 200 were within the reserve. Sea otters in Checleset Bay are largely restricted to a 50 km^2 area directly offshore from the Bunsby Islands, including the Barrier Islands from Clara to Farout. Here they feed extensively on clams, abalone, and sea urchins. At sea otter feeding sites the giant red sea urchin, which limits the distribution of kelp by grazing, has been almost completely eliminated, allowing extensive growth of kelp to occur. At typical sea otter feeding sites from shallows to 10 m in the depth the bull kelp Nereocystis luetkeana forms a dense surface canopy, the understory contains the kelps Pterygophora californica, Laminaria setchellii, Laminaria spp., or a mixture of these, and large amounts of algal drift and detritus are trapped in crevices. By contrast, reef habitats of similar depth but not yet inhabited by sea otters typically support giant red sea urchin densities up to 5-10/m^2, abalone stocks of 1-10/m^2, and little or no kelp in the sea urchin zone. Many other invertebrates are also more abundant in these areas denuded of kelp by sea urchins than at sea otter feeding sites. The present feeding range of Checleset Bay sea otters is identifiable by the near-absence of giant red sea urchins, however clams and less preferred invertebrates are present, and a large part of the reserve is still available for population expansion.

Intertidal and subtidal reef habitats support an immense diversity and biomass of invertebrates and algae. Beneath the stands of kelp is a characteristic dense turf of bladed red algae, while cover on the rock surface often includes coralline algae, barnacles, bryozoans, hydroids, sponges, colonial ascidians, tunicates, and sea anemones. Despite limited sampling in the reserve to date, forty nine species of marine algae and 88 of marine invertebrates have been found. Adaptations to heavy surf, including strong attachment devices, heavy integument, and clustering of individuals, are very evident here. Being large and containing a variety of marine habitats the reserve is expected to contain a high proportion of fish species known to occur long the west coast of Vancouver Island.

OUTSTANDING FEATURES: This is by far the largest and most diverse area of littoral/marine environment on the British Columbia coast that has protected status, and at present contains over half the Canadian population of the endangered sea otter.

OTHER INFORMATION: Order-in-Council no. 2566, 10 December 1981. Application no. 279. Map no. 92 L/3; L/4. Marine chart no. 3623; 3683. Accessible by boat or float plane. Two Indian Reserves are within the ecological reserve.

Reports available on sea otter surveys and behaviour, and on the effects of sea otters on subtidal community structure.

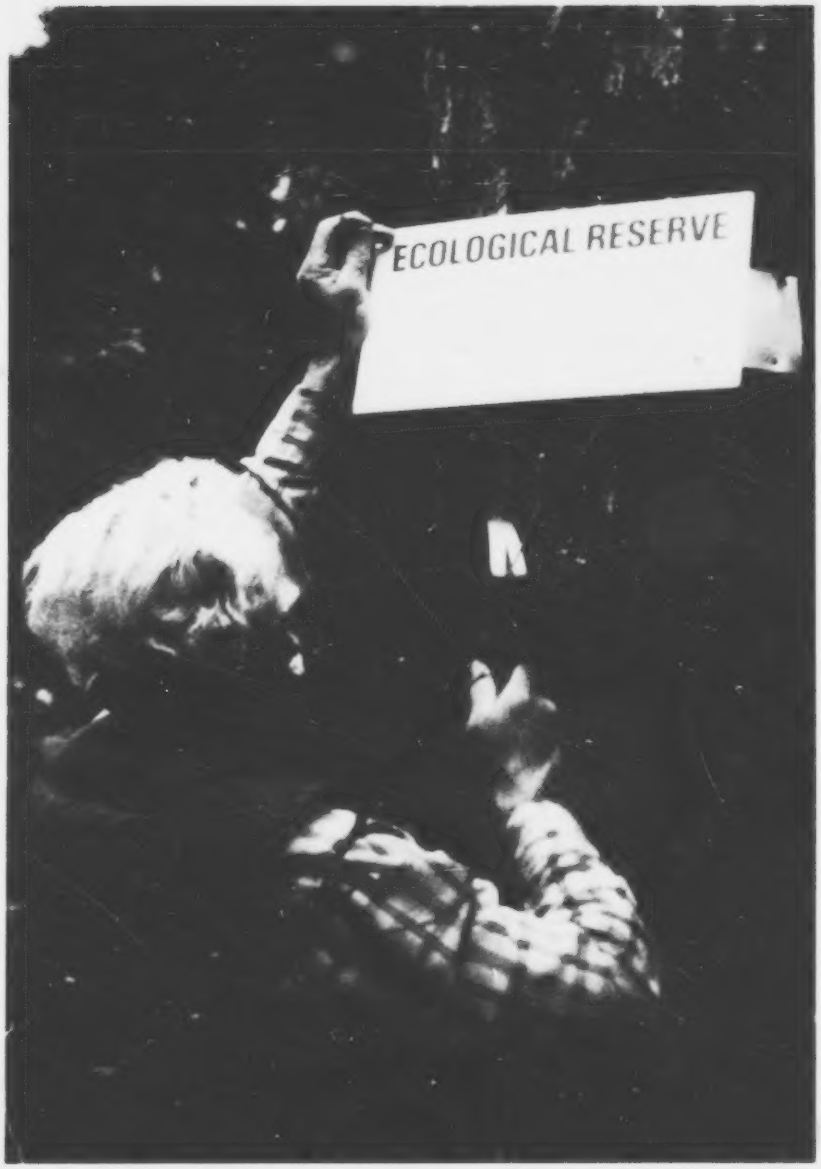


Figure 15. Volunteer Warden Program

Volunteer wardens, usually recruited from naturalists clubs, help to protect ecological reserves. Each warden "adopts" one or more reserves preferably near his/her home and reports on the reserves' well-being on a regular basis. Here Mr. Peter Legg, a warden from the North Okanagan Naturalist Club, identifies the boundaries of the Buck Hills Road Reserve (#6). Wardens also promote public appreciation of ecological reserves through slide presentations and guided tours. (Photo L. Milnes)

MCQUEEN CREEK

E.R. #110

PURPOSE: To protect vegetation typical of the Middle Grassland in interior British Columbia

LOCATION: In Batchelor Hills, 5 km N of Westsyde near Kamloops

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SIZE: 35 ha LAT: 50°49'N LONG: 120°20'W ELEVATION: 560 - 670 m

BIOGEOCLIMATIC ZONES: Ponderosa Pine; Bunchgrass

PHYSICAL FEATURES:

The reserve lies in the Batchelor Hills area of the Thompson Plateau, adjacent to the valley of the North Thompson River. Soils are predominantly dark brown Chernozems of the McQueen Association, developed on morainal deposits. These are well drained soils of silty loam to silty clay-loam texture. The climate is generally cool and dry with May-September precipitation between 175 and 200 mm, a climatic moisture deficit of 300 mm, and freeze-free period of 140 days.

BIOTIC FEATURES:

About two-thirds of the reserve is grassland, the remainder forested. Grasslands are fairly typical of the Middle Grassland elevational zone in British Columbia which occurs above the sagebrush - bunchgrass zone of the valley bottoms and below the fescue-dominated zones at higher levels. Typical communities here, especially on southerly exposed slopes, are dominated by bluebunch wheatgrass and Sandberg's bluegrass. Prickly-pear cactus may be locally abundant, and well-spaced ponderosa pine trees occur in some areas. Other characteristic plants include junegrass, needle-and thread grass, yarrow, Nuttall's pussytoes, pasture sage, arrow-leaved balsam-root, cut-leaved daisy, and oyster plant. Communities on northerly exposed slopes show affinities with the Upper Grassland elevational zone, being dominated by rough fescue, bluebunch wheatgrass and Thompson's paintbrush, or by rough fescue and death-camas. The steeper north-facing slopes above McQueen Creek support Douglas fir - pinegrass stands.

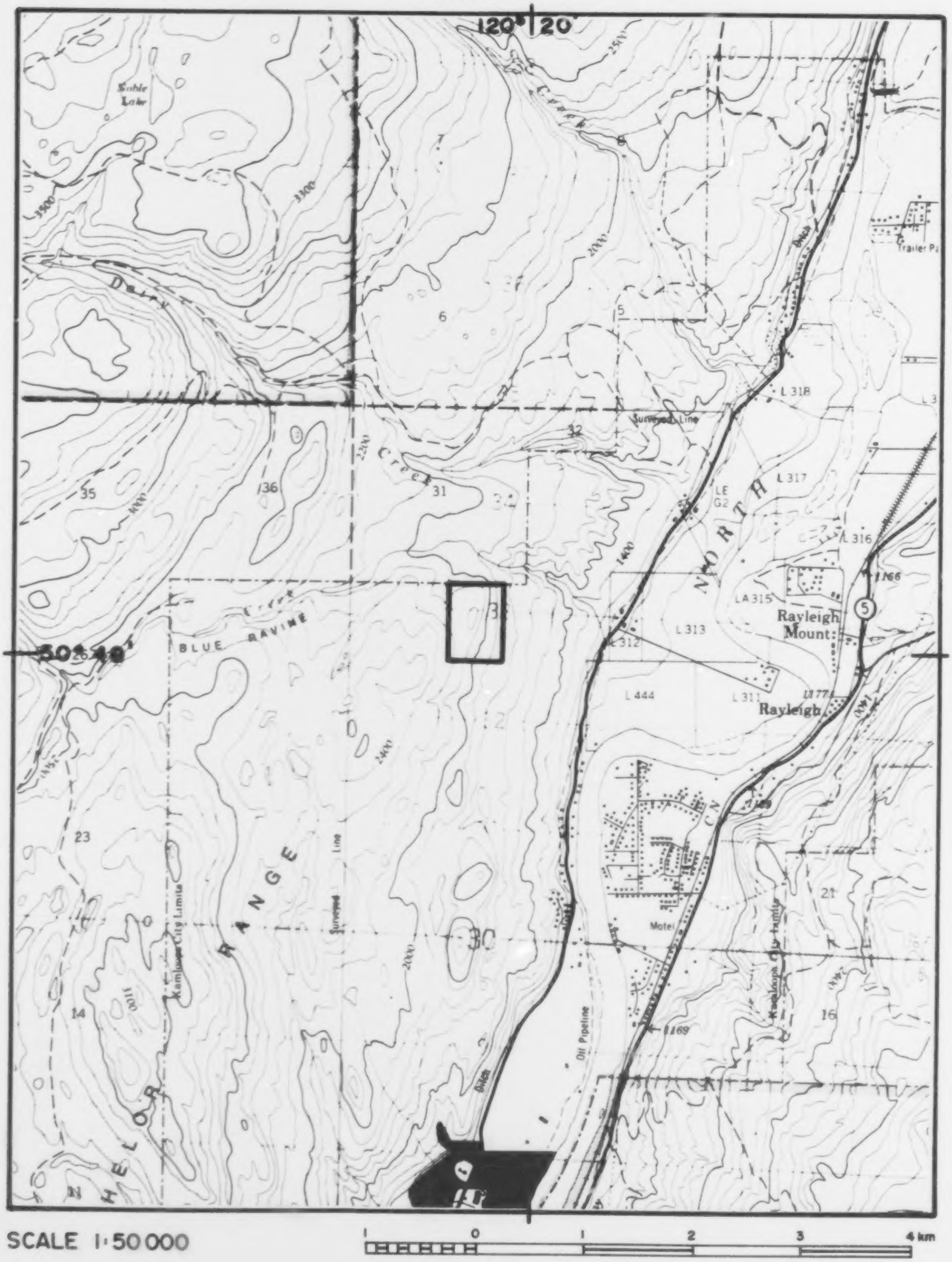
A variety of showy spring wildflowers is present, including arrow-leaved balsam-root, nodding onion, heart-leaved arnica, upland larkspur, fleabanes, yellowbell, old man's whiskers, large-fruited desert-parsley, and silverleaf phacelia.

A fauna has not been surveyed. Lands in this area are important winter range for mule deer.

OUTSTANDING FEATURES: Pristine grassland, little affected by grazing or recreational use.

OTHER INFORMATION: Order-in-Council no. 1099, 9 June 1982. Application no. 321. Map no. 92 I/16. Access by foot (1 km) west from road north of Westsyde. The reserve is within Kamloops City Limits.

2-110B


120°20'
50°40'
Sable Lake
3300
2500
2000
Dairy
Creek
Creek
BLUE RAVINE
Creek
2200
2400
1400
1100
Surveyed Line
Surveyed Line
Ditch
Oil Pipeline
Motel
Kamloops City Limits
Kamloops City Limits
Trailer Pa
N O R T H
R A N G E
N H E L O R
CN
L 318
L 317
L 316
LA 315
L 313
L 312
L 444
L 311
LE G2
Rayleigh Mount
Rayleigh
5
6
32
35
36
31
34
33
23
14
30
21
16
1
0
1
2
3
4 km

SCALE 1:50 000

N.T.S. No. 92 I/16

ECOLOGICAL RESERVE No. 110
McQUEEN CREEK

ROBSON BIGHT

E.R. #111

PURPOSE: To protect key habitats for killer whales, to prevent harassment of whales while using those habitats, and to maintain unique opportunities for killer whale research and interpretation

LOCATION: Vancouver Island side of western Johnstone Strait, 10 km SE of Telegraph Cove

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SIZE: 1,248 ha LAT: 50°28' - 50°31'N LONG: 126°30' - 126°37'W
ELEVATION: -400 to 0 m

BIOGEOCLIMATIC ZONE: Not applicable

PHYSICAL FEATURES:

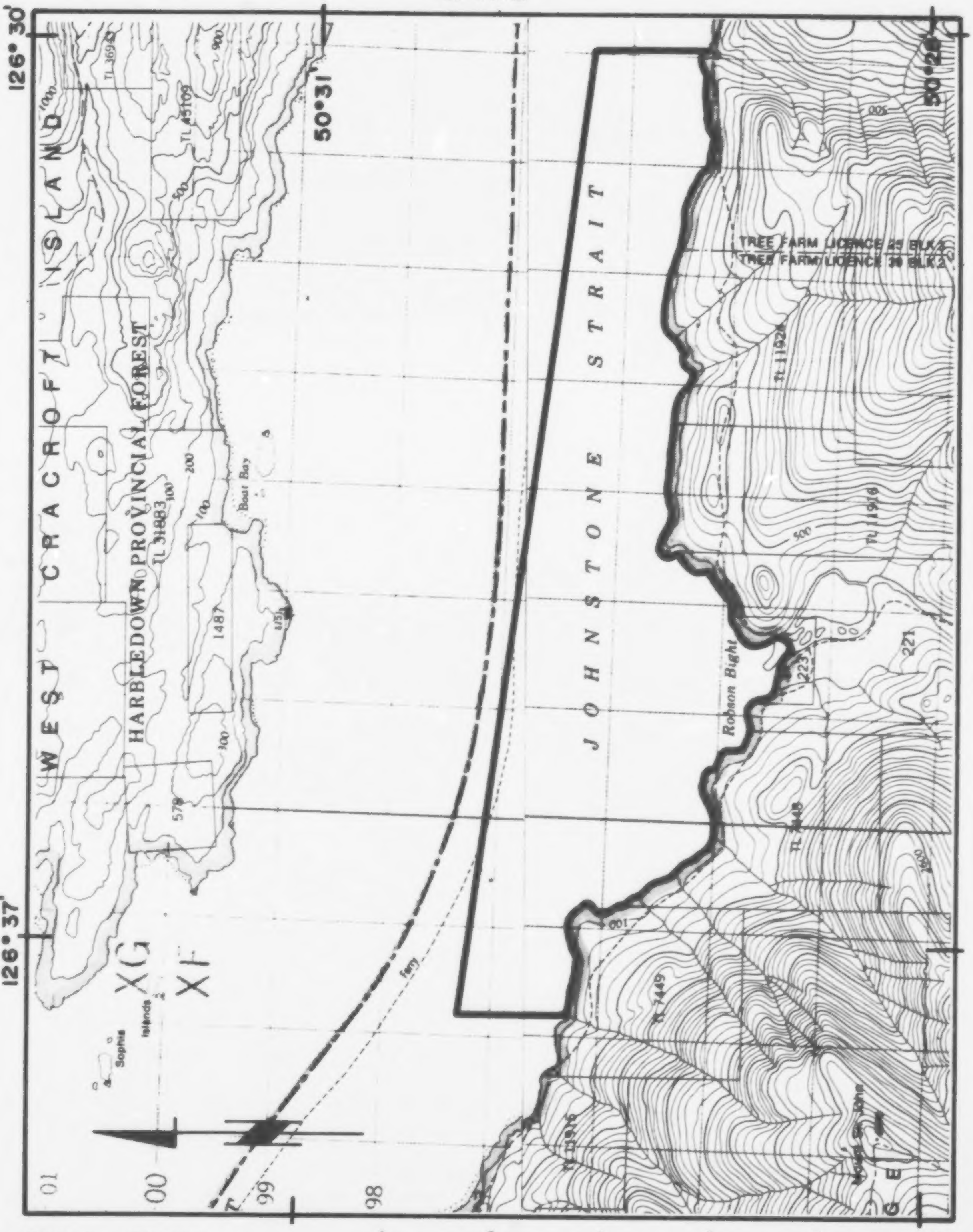
The reserve is entirely marine. Its southern boundary follows 10.7 km of Vancouver Island shoreline having a few rocky headlands and one significant bay (Robson Bight), but lacking sheltered moorage. Shoreline materials are largely rock and cobble, except for the Tsitika River estuary which has deposits mostly of gravel, sand, and mud. Water depths plunge rapidly to 400 m or more in the glacially scoured center of Johnstone Strait. Surface temperatures are usually under 10°C in July (compared to 15-20°C or more in Georgia Strait); about 7°C in winter. Strong tidal currents result in constant mixing of Johnstone Strait waters at all depths, and in narrow ranges in salinity and dissolved oxygen. As a result, the bottom fauna is rich and not subjected to the devastating effects of low oxygen suppy that plague some of the silled basins and fjords along the coast.

BIOTIC FEATURES:

Just as the strategic location of Johnstone Strait results in much marine traffic of human origin, so too is this a key migratory funnel for waterfowl, salmon, and whales. Up to 70% of salmon heading for Fraser River spawning grounds pass through these waters.

Johnstone Strait is used year-round by a "community" of 13 pods (family groups) of killer whales or orcas (Orcinus orca) totalling 160 animals, which reside permanently between Campbell River and Prince Rupert and contain recognizable individuals. Robson Bight and adjacent waters in the reserve have been indentified as a "core" area for the north-coast killer whale community, based on some use by seven to eight pods (65 to 85 whales), and very frequent use by three pods totalling 30 whales. Robson Bight is visited mainly from June to October, the major period of salmon migration through Johnstone Strait. Studies indicate that pods enter the Bight on about 80% of the days they are present in western Johnstone Strait and remain for one to two hours per visit. Individual pods may visit the bight several times per day. The whales behave differently at Robson Bight than in adjacent waters; there is less travelling, less feeding, more resting, more play, more rubbing on beaches and rocks, and perhaps more sexual activity than in other areas. Killer whales may be seen with greater

2-111B


126° 30'
126° 37'
50°31'
50°28'
WEST CRACROFT ISLAND
HARBLEDOWN PROVINCIAL FOREST
JOHNSTONE STRAIT
Robson Bight
Boat Bay
TREE FARM LICENCE 25 BLK 3
TREE FARM LICENCE 39 BLK 2
TL 31883
TL 11926
TL 11916
TL 7449
Sophia Islands
Ferry
XG
XF
01
00
99
98

SCALE 1:50000

1 0 1 2 3 4 km

N.T.S. No. 92 L/7,10

ECOLOGICAL RESERVE No. 111
ROBSON BIGHT

regularity in this area than any other place on the British Columbia coast. However, they are more sensitive to disturbance when near shore, in the bight, than when travelling and feeding offshore.

The Tsitika River estuary, the only undisturbed estuary on the east coast of Vancouver Island, is an important feature of the reserve. Two major vascular plant communities occur in the inner estuary. The extensive tufted hairgrass community, containing red fescue, silverweed, and meadow barley as sub-dominants, occupies the upper estuary and is replaced seaward by stands of Lyngbye's sedge, interspersed with the rockweed *Fucus distichus*, species tolerant of more frequent tidal flooding. Nutrient rich sites in the hairgrass and sedge zones are very productive (above-ground biomass up to 600 - 850 g/m^2).

All five species of Pacific salmon, plus steelhead and cutthroat trout, dolly varden char, and eulachons migrate through the estuary to spawning grounds in the Tsitika River. Coho and pink salmon and steelhead are the most abundant salmonids. The estuary supports high populations of two invertebrates, caddis fly larvae and the crustacean *Neomysis mercedes*. These are fed upon extensively by juvenile salmonids, especially coho and dolly varden, for which the estuary is an important rearing area.

Diverse shallow-water subtidal communities, varying primarily in response to current exposure and kind of substrate, occur in Robson Bight. Headlands at the east and west extremities of the Bight have rocky substrates and strong back-eddies caused by Johnstone Strait currents. Marine life is abundant, typical forms being coraline algae, white-plumed anemones, starfishes, Pacific giant barnacles, pinto abalone, purple-hinged rock scallops, rockfishes, and ling cod. Further into the Bight, substrates are still rocky, but current exposure is less. Here seaweeds are more common, sea urchins and lined chitons are abundant, and fish less abundant, except for the kelp greenling. Kelp beds near the estuary have a particularly diverse flora and fauna, and provide important feeding habitat for juvenile coho salmon, dolly varden char, and herring.

OUTSTANDING FEATURES: The reserve is unique for its intensity of use by killer whales, and the range of activities engaged in by them. It offers better opportunities for research on and interpretation of these animals than anywhere else on the British Columbia coast. The reserve also protects an intact estuary and rich marine life.

OTHER INFORMATION: Order-in-Council no. 1134, 17 June 1982. Application no. 111. Map no. 92 L/7; L/10. Marine chart no. 3568. Accessible by boat.

Considerable commercial and private whale-watching currently takes place near the reserve, and is increasing steadily. Commercial fishing and general boat traffic also occur.

Research projects have been undertaken on killer whale behaviour and communication, and on potential human disturbance. A few scientific and many popular articles are available on killer whales in the reserve and vicinity. Reports are also available on estuary vegetation and fishery/marine resources.

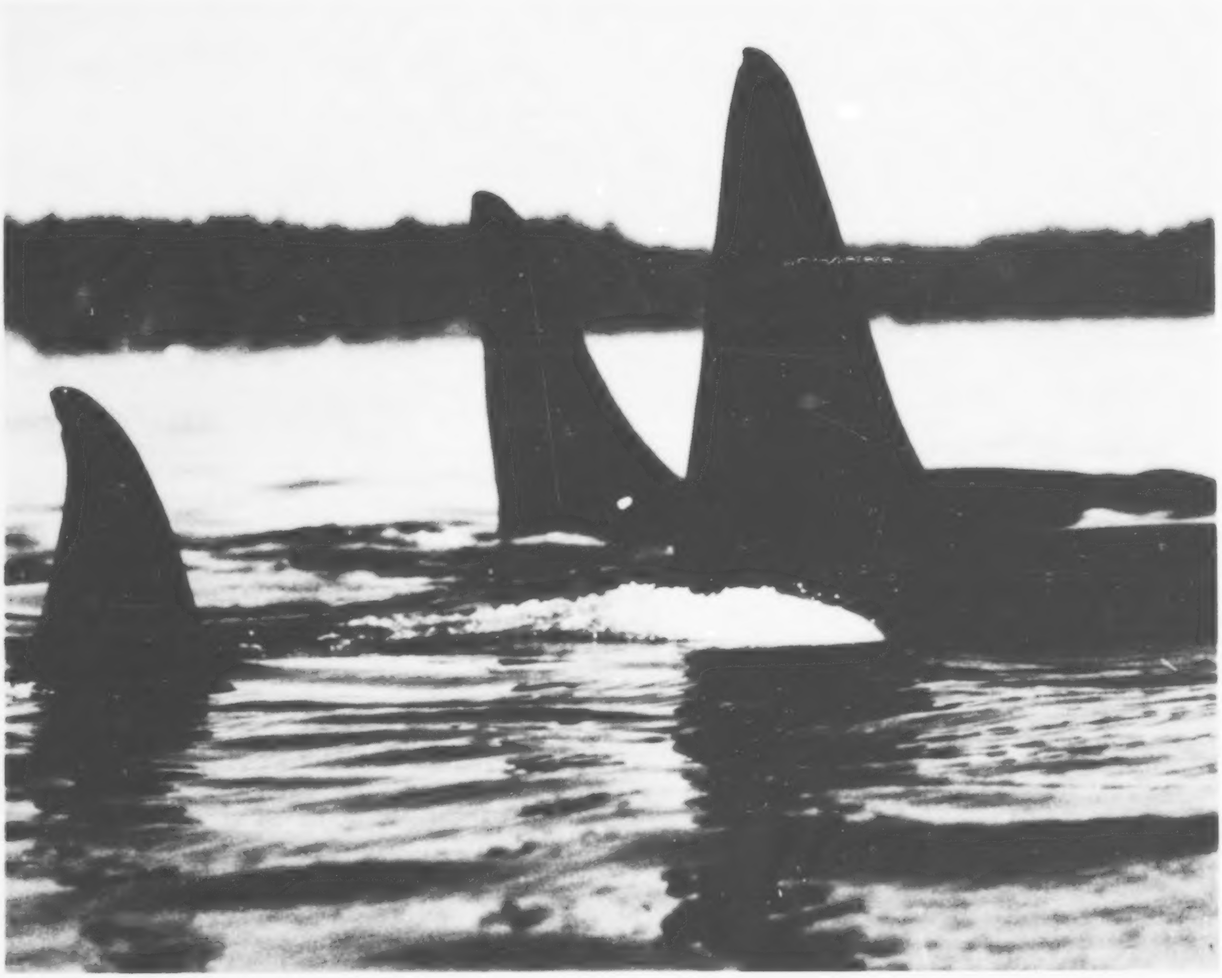


Figure 16. Killer whales (Orcinus orca) near the Robson Bight Ecological Reserve (#111)

Killer whales frequent the Robson Bight Reserve almost daily from July to October each year. Whales sometimes feed in the reserve, but mostly use the area for resting, rubbing and social interactions. The predictable presence of whales in the reserve and their generally well-defined travel pattern through Johnstone Strait offer unique opportunities for whale watching and research. (Photo J. Borrowman)

MOUNT TZUHALEM E.R. #112

PURPOSE: To preserve outstanding Garry oak - wildflower stands

LOCATION: 4 km ENE of Duncan, Vancouver Island

SIZE: 18 ha LAT: 48°47'N LONG: 123°38'W ELEVATION: 120 - 280 m

BIOGEOCLIMATIC ZONE: Coastal Douglas Fir

PHYSICAL FEATURES:
Mount Tzuhalem consists of strongly bedded conglomerates and sandstones. The reserve, at middle elevations on the western side of the mountain, faces southwest and has strongly sloping, internally hilly terrain. Soils, where developed, are shallow Sombric and Dystric Brunisols. Hollows between rock outcrops may contain seepage water in spring, but the whole area dries out quickly in summer.

BIOTIC FEATURES:
Groves of Garry oak separated by wildflower meadows and mossy outcrops, together with scattered, gnarled, Douglas fir and arbutus trees, give the site a parkland appearance. The dense, showy wildflower stands are at their best in April and May. Seven plant communities have been described.

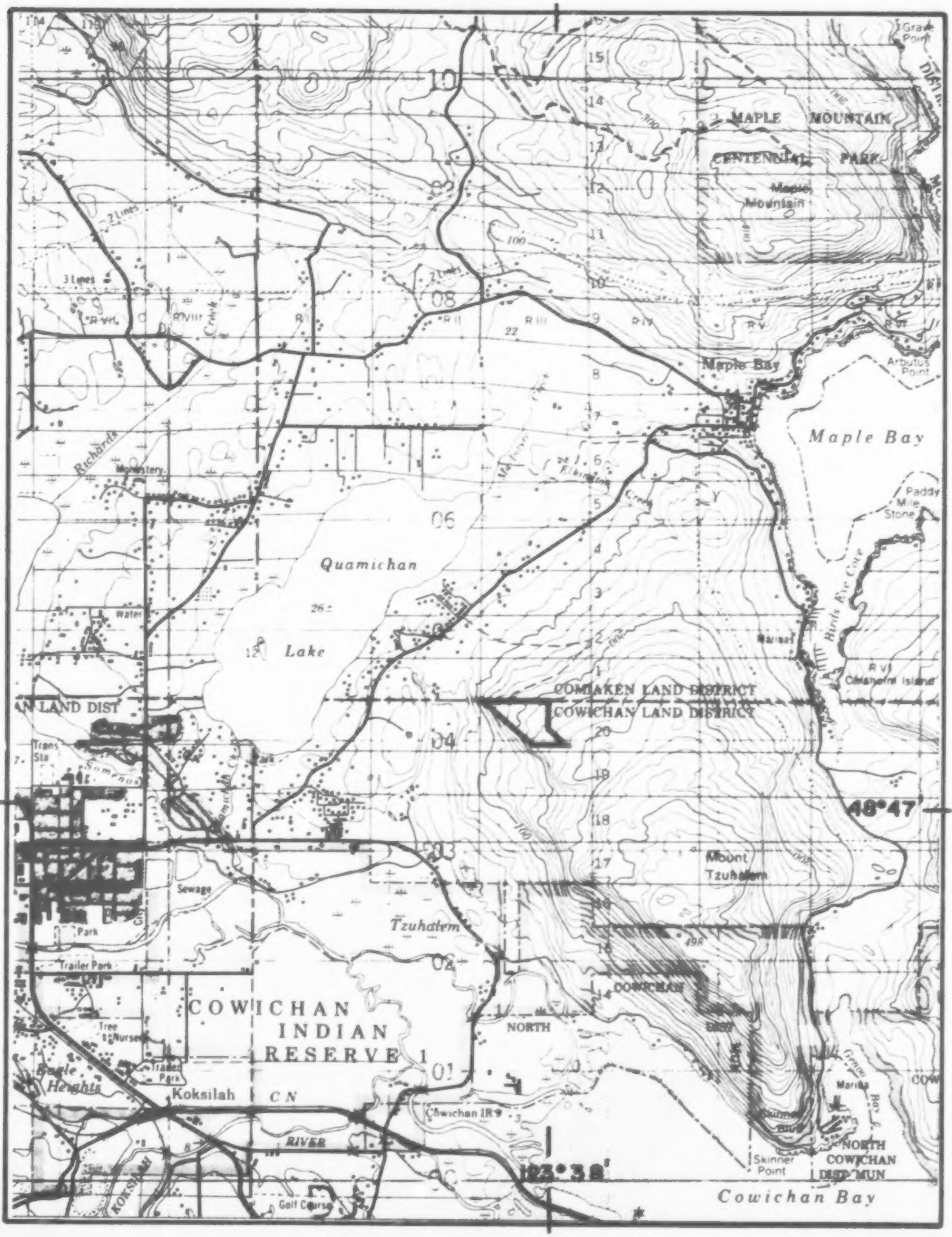
Garry oak - common snowberry woodland occurs on the deeper soils and among rock outcrops. Douglas fir and arbutus may be present, and conspicuous shrubs are ocean-spray and tall Oregon-grape. The wildflower meadows, dominated by camas and sea blush, occur on shallow soils subject to summer drought. Six or more species of grass occur in the meadows, of which Kentucky bluegrass and sweet vernalgrass are most common. Legumes are also diverse, including bicolored lupine, bird's-foot trefoil, four species of clover, and two vetches. Showy subdominant wildflowers are shooting stars, western buttercup, field chickweed, dovefoot geranium, death-camas, fool's-onion, yarrow, chocolate lily, Menzies' larkspur, Hooker's onion, and forget-me-nots. Wet hollows in the meadows commonly support grassland saxifrage, blinks, and narrow-leaved montia. A fringe community, dominated by tall Oregon-grape and white fawn lily, sometimes forms a transition between oak woodlands and camas meadows. Four other communities are associated with rocky habitats.

OUTSTANDING FEATURES: Finest example of Garry oak woodlands and associated spring wildflowers in British Columbia. This ecosystem does not occur elsewhere in Canada. Several rare plants occur, among which the deltoid balsam-root (Balsamorhiza deltoidea), white-topped aster (Aster curtus) and Nuttall's quillwort (Isoetes nuttallii) are most noteworthy.

OTHER INFORMATION: Order-in-Council no. 919, 16 May 1984. Application no. 237. Map no. 92 B/13. Plant lists have been prepared.

The reserve is accessible by road, and bounded on the north by a residential sub-division. Recent impacts include some tree cutting, trail bike damage, and campfires.

2-112B



Grave Point
MAPLE MOUNTAIN CENTENNIAL PARK
Maple Mountain
Maple Bay
Arbutus Point
Paddy Mile Stone
Birds Eye Cove
Quamichan
Lake
Richards Creek
Monastery
Elkington Creek
COMIAKEN LAND DISTRICT
COWICHAN LAND DISTRICT
Trans Sta
Water
Park
Sewage
Tzuhalem
48°47'
Mount Tzuhalem
COWICHAN INDIAN RESERVE 1
NORTH
Trailer Park
Tree Nursery
Eagle Heights
Koksilah
CN
RIVER
Cowichan IR 9
Golf Course
123°38'
Marina
Genoa Bay
Skinner Point
NORTH COWICHAN DIST MUN
Cowichan Bay

SCALE 1:50 000

1
0
1
2
3
4 km

N.T.S. No. 92 B/13

ECOLOGICAL RESERVE No. 112
MOUNT TZUHALEM

HONEYMOON BAY

E.R. #113

PURPOSE: Preservation of showy stands of the rare pink fawn lily

LOCATION: On Sutton Creek, 9 km W of Lake Cowichan town

SIZE: 7.5 ha LAT: 48°49'N LONG: 124°12'W ELEVATION: 160 - 170 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

The reserve is located where Sutton and Millar Creeks issue from the Vancouver Island mountains, depositing alluvial materials in a reach of reduced gradient, 1.5 km upstream from the Creek mouth at Cowichan Lake. Sutton Creek winds through the middle of the reserve. Soils are primarily Regosols developed on floodplain deposits. The climate is mild and moist, with mean annual precipitation of 212 cm, and mean daily January and July temperatures of 1 and 17°C respectively.

BIOTIC FEATURES:

The major feature is a large population of the pink fawn lily (Erythronium revolutum), a delicate wildflower confined in British Columbia to southeastern Vancouver Islands, Valdes Island, and the Kingcome Inlet area, and considered to be uncommon in the province. This species prefers moist alluvial sites in moderately open woodland, particularly containing deciduous trees like bigleaf maple and red alder. Such conditions are ideally represented in the reserve, where the characteristic association is a big leaf maple - red alder - fawn lily - yellow violet type. The fawn lilies require four to six years from seed to blooming plant, and the slender corms perish if the leaves are picked. Dense cluster of these striking flowers bloom here primarily in April.

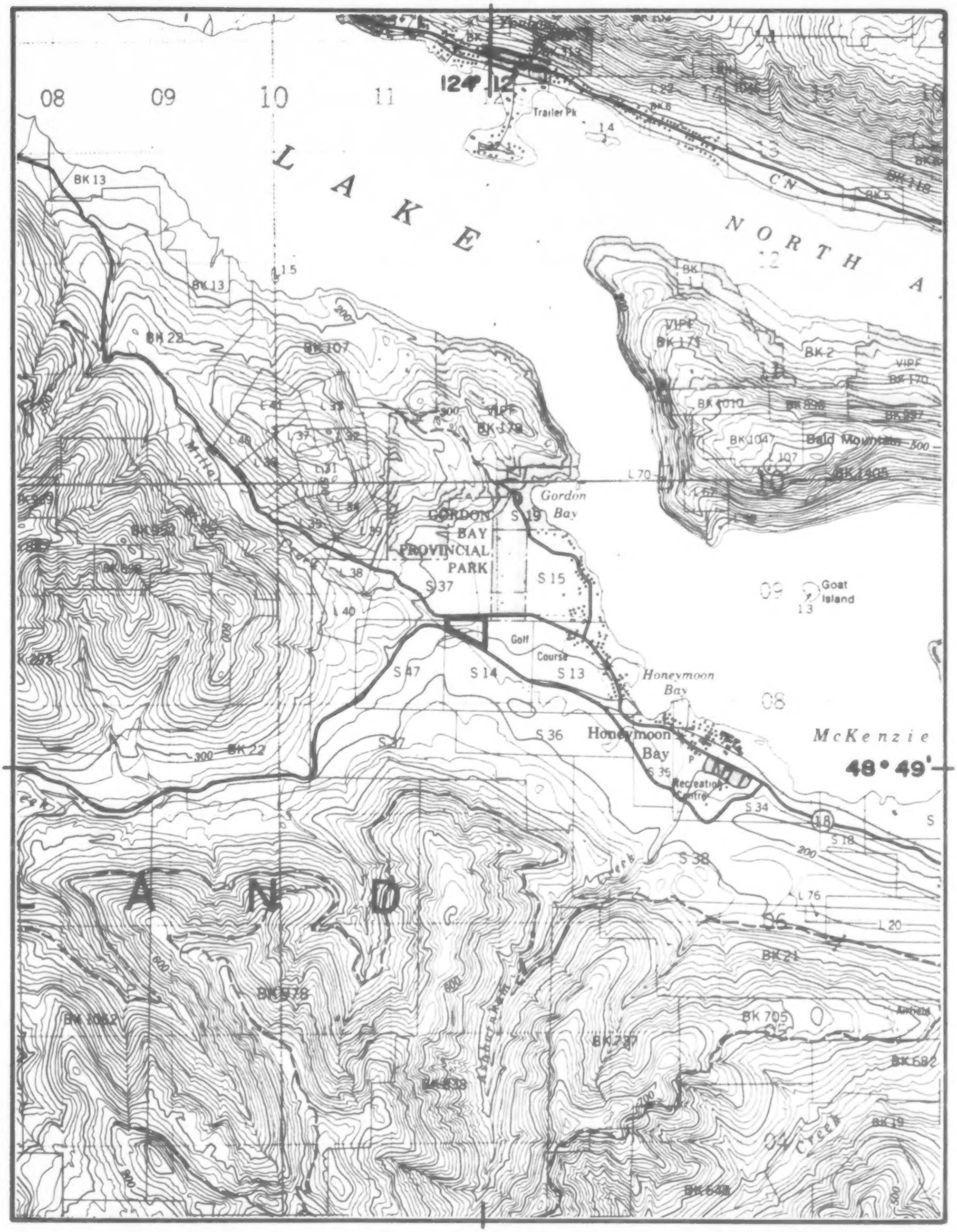
Slightly higher ground away from the creek supports seral coniferous forest stands in which western hemlock, western redcedar, and Douglas fir are present. Additional wildflowers in the reserve are trillium, red columbine, wild ginger, bleeding heart, false lily-of-the-valley, star-flowered false Solomon's-seal, clasping twistedstalk, Smith's fairybells, and buttercups. Ferns of several species are well represented.

OUTSTANDING FEATURES: A magnificient spring floral display dominated by the pink fawn lily.

OTHER INFORMATION: Order-in-Council no. 1554, 10 September 1984. Application no. 368. Map no. 92 C/16. Access by roads, which follow both the north and south boundaries. A golf course borders the reserve on the east.

Reserve lands were donated by Western Forest Industries to the Nature Trust of British Columbia, who in turn have leased the area to the government for use as an ecological reserve. Trails and interpretive signs are present.

2-113B


LAKE
NORTH A
Trailer Pk
CN
GORDON BAY PROVINCIAL PARK
Gordon Bay
Golf Course
Honeymoon Bay
Recreation Centre
Goat Island
Bald Mountain
McKenzie
48° 49'
124° 12'
LAND
S 19
S 15
S 37
S 47
S 14
S 13
S 36
S 35
S 34
S 38
S 18
BK 13
BK 22
BK 107
VIPF BK 178
BK 171
BK 2
VIPF BK 170
BK 1010
BK 1047
BK 1405
BK 21
BK 705
BK 682
BK 19
BK 1062
BK 978
BK 838
BK 737
BK 648
L 70
L 76
L 20
08
09
10
11
12
18
200
300
500
600

SCALE 1:50000

1 0 1 2 3 4 km

N.T.S. No. 92 C/16

ECOLOGICAL RESERVE No. 113
HONEYMOON BAY

WILLIAMS CREEK

E.R. #114

PURPOSE: To conserve terraced bogs and representative forests of the Coastal Western Hemlock Zone in northwestern B.C.

LOCATION: S side of Williams Creek, 20 km SE of Terrace

SIZE: 700 ha LAT: 54°22'N LONG: 128°15'W ELEVATION: 490 - 1735 m

BIOGEOCLIMATIC ZONES: Coastal Western Hemlock; Mountain Hemlock; Alpine Tundra

PHYSICAL FEATURES:

The reserve encloses the northwestern end of a northwest-southeast trending mountain chain in the Kitimat Ranges. Most terrain is steeply sloping, but an area of moderate relief occurs at the western end of the reserve. The terraced bogs are found in this area. Most slopes are oriented toward the north or southwest. Three small streams have eroded gullies into the steep north slope of the reserve, where avalanche tracks also occur. Alpine glaciers are not present.

BIOTIC FEATURES:

Mesic forests dominated by Sitka spruce, western hemlock, and amabilis fir dominate at lower elevations. Spruce here up to 60 m tall and 500 years in age have been noted. Characteristic understory species are devil's club, Alaskan blueberry, oak fern, lady fern, five-leaved bramble, and mosses. A western redcedar - skunk cabbage association occurs on restricted swampy areas.

A series of interesting terraced bogs occurs on gently sloping terrain within the western hemlock zone. Terraces between the bog ponds are dominated by sedges, bog club-moss, three-leaved goldthread, sundews, and sphagnum moss. Shallow ponded areas are characterized by buckbean, deeper waters by waterlily.

Higher elevation forests in the Mountain Hemlock Zone typically support mountain hemlock with an understory of blueberry species and mosses, but additional communities are expected to occur.

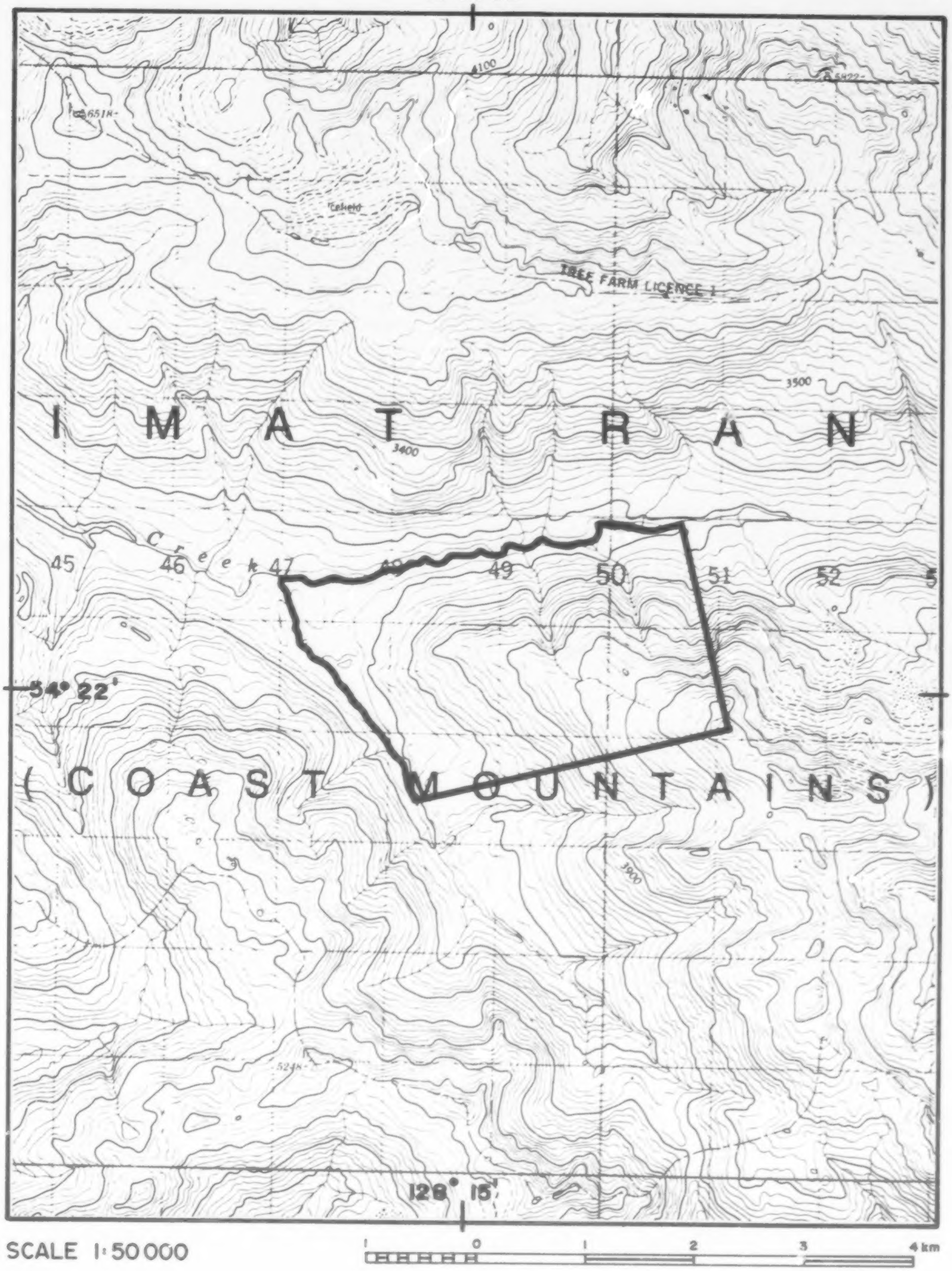
Wildlife information has not been collected, but this area has a rather low capability for moose and mountain goats because of extensive coniferous cover and excessive snow depth. However, excellent habitat is present for grizzly and black bears and many other species.

OTHER FEATURES: The reserve contains research plots established by the Ministry of Forests. Fossil pollen found in the bogs could reveal forest succession since the last glaciation.

OTHER INFORMATION: Order-in-Council no. 1655, 29 August 1985. Application no. 274. Map no. 103 I/8.

The reserve is in a natural state. Logging road access is available up Williams Creek, but the creek must be crossed to get into the reserve.

2-114B


6518
4100
5422
Icefield
TREE FARM LICENCE 1
3500
IMAT RAN
3400
Creek
45
46
47
48
49
50
51
52
5
54° 22'
(COAST MOUNTAINS)
3900
5248
128° 15'
1
0
1
2
3
4 km

SCALE 1:50000

N.T.S. No 103 I/8

ECOLOGICAL RESERVE No. 114
WILLIAMS CREEK

GINGIETL CREEK E.R. #115

PURPOSE: To conserve an undisturbed coastal watershed of wide elevational range for forest ecology, vegetation, wildlife ecology and hydrology studies

LOCATION: 35 km upstream from mouth of Nass River; 85 km NNW of Terrace

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SIZE: 2,873 ha LAT: 55°12'N LONG: 129°16'W ELEVATION: 20 - 1950 m

BIOGEOCLIMATIC ZONES: Coastal Western Hemlock; Mountain Hemlock; Alpine Tundra

PHYSICAL FEATURES:

The reserve comprises the steep south-east facing drainage of Gingietl Creek and a series of lower north-east oriented ridges in its south-east corner. Gingietl Creek is partly fed by waterfalls from steep tributaries. The lower part of the reserve is characterized by gently sloping alluvial fans merging with the Nass River floodplain. Glaciers and small alpine tarns are present in the alpine zone. Snowfall is heavy in this area.

BIOTIC FEATURES:

Western hemlock forests dominate the lower slopes, but less extensive forests of western redcedar and Sitka spruce, the latter including deciduous trees, are also present. On the low ridges in the southeastern portion of the reserve, seral forests of lodgepole pine and hemlock are found. Skunk cabbage swamps occupy wet areas at the foot of the slopes. Mountain hemlock stands dominate at elevations above the previous forest types and a Sitka alder community occupies slide and avalanche stopes. Subalpine willow (shrub) communities and alpine tundra are also found at higher elevations, but have not yet been surveyed.

In the lowlands, hybrids between Engelmann spruce and Sitka spruce, and the rare Anderson's sword fern (Polystichum andersonii) are present. Black cottonwood reaches its most westerly distribution in the Nass River valley at this location.

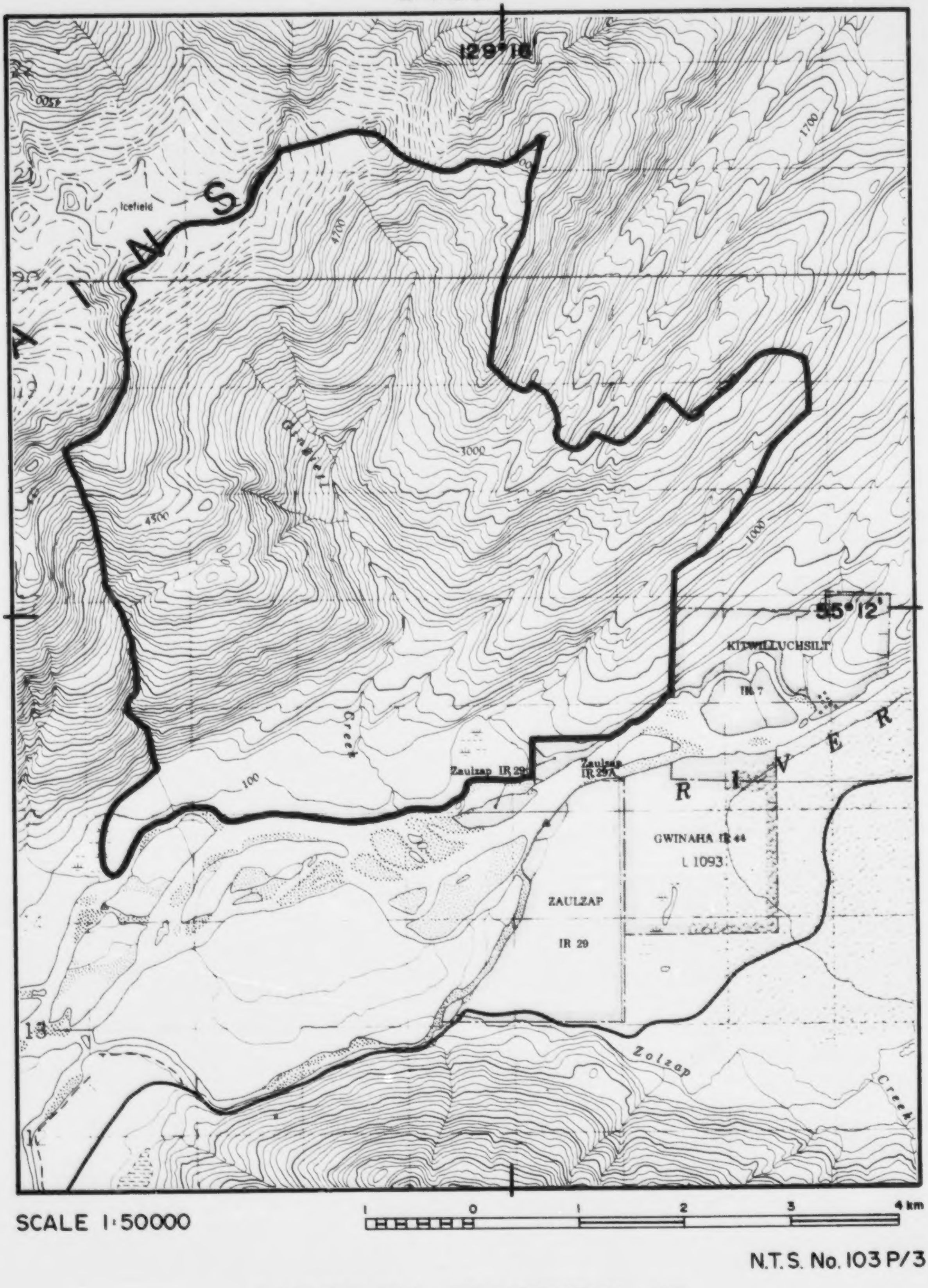
The presence of bald eagle, grizzly bear and black bear has been reported. Moose occur along the Nass River Valley. The reserve is an excellent location to study wildlife species adapted to mature, coastal coniferous forests.

OUTSTANDING FEATURES: The reserve includes the entire drainage system of Gingietl Creek, and an elevational sequence of three biogeoclimatic zones.

OTHER INFORMATION: Order-in-Council no. 1654, 29 August 1985. Application no. 119. Map no. 103 P/3.

The reserve is in a natural state. Access by helicopter, or by logging road to south side of Nass River followed by boat crossing of the river.

2-115B


129°16'
Icefield
4700
1700
3000
4500
1000
100
Gingietl
Creek
55°12'
KITWILLUCHSILT
IR 7
Zaulzap IR 29
Zaulzap IR 29A
R I V E R
GWINAHA IR 44
L 1093
ZAULZAP
IR 29
Zolzap
Creek
1 0 1 2 3 4 km

SCALE 1:50000

N.T.S. No. 103 P/3

ECOLOGICAL RESERVE No. 115
GINGIETL CREEK

KATHERINE TYE (VEDDER CROSSING) E.R. #116

PURPOSE: To protect a population of the very rare Austin's phantom orchid

LOCATION: Thornton Road, 3 km SE of Vedder Crossing

SIZE: 3.1 ha LAT: 49°06'N LONG: 121°56'W ELEVATION: 300 m

BIOGEOCLIMATIC ZONE: Coastal Western Hemlock

PHYSICAL FEATURES:

The reserve is located on a ridge formed by remnants of a major body of inter and postglasical outwash. The southern one-third has steep, eroding slopes facing the Chilliwack River Valley and the remainder slopes gently towards the Fraser Valley to the north. Surface soils are loamy and rich.

BIOTIC FEATURES:

This small reserve contains second-growth red alder - bigleaf maple forest with paper birch and bitter cherry occurring occasionally. In the southern portion a few coniferous trees project above the deciduous tree canopy. Vine maple is present. The orchids occupy a variety of forest and forest-margin habitats in the northern, gently sloping two-thirds of the reserve.

Austin's phantom orchid (Cephalanthera austinae) is very likely the rarest orchid in British Columbia and among the rarest of plants in all of Canada. The term phantom is indeed descriptive of this plant which is rare throughout its range, has ghost-like white blooms, and shows inexplicable variations in abundance in any one area. In B.C. this species is known to occur only at a few sites in the Fraser Valley, and on Saltspring Island. The fleshy roots, bract-like leaves, stems, and blooms, except for a touch of yellow at the centre of each flower, are all waxy white. Within the reserve, records kept by the late Mrs. Katherine Tye show that between 1964 and 1978 the orchid population varied from none (one year) to over 100, with an average of about 35 plants per year.

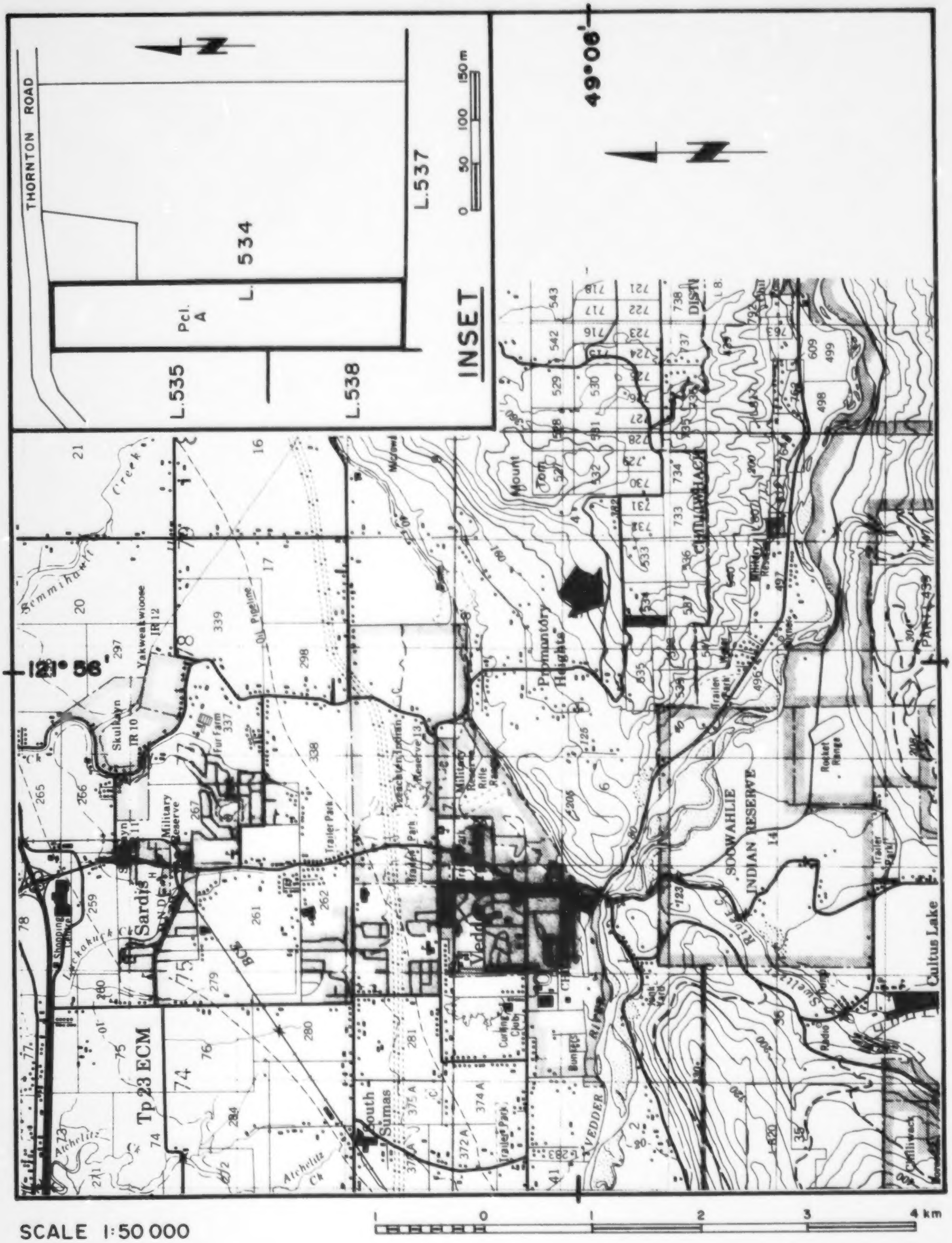
OUTSTANDING FEATURES: A small population of the very rare Austin's phantom orchid, (Cephalanthera austinae).

OTHER INFORMATION: Order-in-Council no. 2171, 10 December 1986. Application no. 314. Map no. 92H/4. Access by road from Vedder Crossing.

Phantom orchids at this site were discovered by Mrs. Tye in 1964 and watched over carefully by her until her death in 1987. The reserve consists of lands donated by Mrs. Tye and additional land purchased by the Nature Trust of British Columbia.

Information on the phantom orchid is found in an article by Ron Long in Davidsonia, 10(2): 30-33.

2-116B


INSET
THORNTON ROAD
L.534
L.535
L.537
L.538
Pcl. A
0 50 100 150m
49°06'
121°56'
Promontory Heights
Mount Tom
CHILLIWACK
SOOWAHLIE INDIAN RESERVE
Sardis
South Sumas
Cultus Lake
VEDDER RIVER
Tp 23 ECM
Rocket Range
0 1 2 3 4 km

SCALE 1:50 000

N.T.S. No. 92 H/4

ECOLOGICAL RESERVE NO. 116
KATHERINE TYE (VEDDER CROSSING)

HALEY LAKE

E.R. #117

PURPOSE: To conserve a small population of the rare and endangered Vancouver Island Marmot

LOCATION: On Vancouver Island, approximately 32 km SW of Nanaimo

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SIZE: 93 ha LAT: 49°01'N LONG: 124°18'W ELEVATION: 1140 - 1518 m

BIOGEOCLIMATIC ZONE: Mountain Hemlock

PHYSICAL FEATURES:

The reserve consists of steep rocky, south, east and northeast-facing slopes of a subalpine ridge and the upper parts of associated colluvial slopes. The ridge extends southeastward from Green Mountain in the Nanaimo River drainage.

BIOTIC FEATURES:

Major plant community types in this reserve are stunted mountain hemlock and mountain heathers along the ledges and crest of the ridge, sparse moss, lichen and herbaceous plant cover on rocky knolls and faces, and meadow vegetation on talus and other colluvium. The latter is the main habitat of the Vancouver Island marmot. Several different meadown communities occur, with dominants such as pearly everlasting, bracken fern, cow-parsnip, showy sedge and Indian hellebore, depending on drainage and soil texture. Rare plants occurring here are the Olympic Mountain aster (*Aster paucicapitatus*), the Olympic onion (*Allium crenulatum*), and the coastal shield fern (*Dryopteris arguta*).

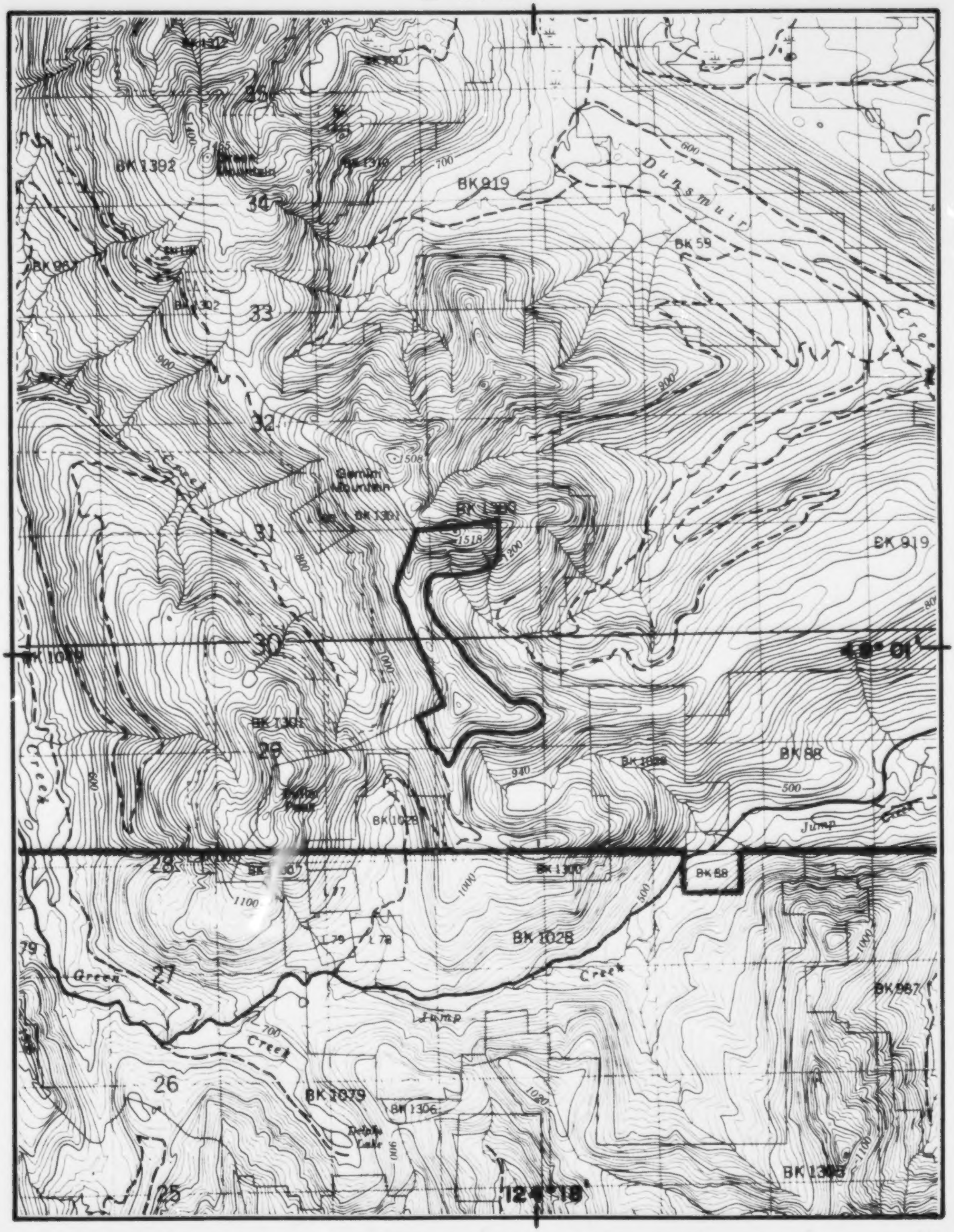
The Vancouver Island marmot (*Marmota vancouverensis*), a species endemic to the island for which it is named, has only about 250 individuals in its world population. Though related to the hoary marmots of the mainland, this island form has evolved in isolation for thousands of years, resulting in very distinctive characteristics like its chocolate-brown coat. Marmots occur only high in the mountains of the southern half of the island. Similar to other marmot species, Vancouver Island marmots inhabit burrows, usually dug under protective boulders, and hibernate between October and May. They live in small scattered colonies and feed on a variety of herbaceous meadow plants and a few low shrubs. Other mountain wildlife such as Roosevelt elk, marten, golden eagles, and gray jays may also be seen in this area.

OUTSTANDING FEATURES: This is the only reserve yet established to protect Vancouver Island marmots and their habitat.

OTHER INFORMATION: Order-in-Council no. 293, 18 February 1987. Application no. 237. Map no. 92F/1. Access to the reserve crosses private land controlled by MacMillan Bloedel Ltd. Land for this reserve was donated by that company.

Research on behaviour and on foraging ecology of the Vancouver Island marmot was conducted here resulting in two M.Sc. theses. Annual reports on the status of Vancouver Island marmots are available.

2-117B



BK 1392
Green Mountain
BK 919
Dunsmuir
BK 59
34
33
32
BK 1302
BK 987
Creek
Gemini Mountain
1508
BK 1301
BK 1300
1518
31
30
49° 01'
BK 1079
BK 1301
29
BK 1028
BK 88
Jump Creek
500
28
BK 1300
BK 88
L 77
L 79
L 78
BK 1028
Green
27
Creek
Jump
Creek
26
BK 1079
BK 1306
25
124° 18'
BK 987
BK 1308

SCALE 1:50 000

1 0 1 2 3 4 km

N.T.S. No. 92 C/16, F/1

ECOLOGICAL RESERVE No. 117
HALEY LAKE

3.0 APPENDICES

APPENDIX A - Ecological Reserves Act and Regulations

Ecological Reserves Act

[Consolidated for convenience only, January 20, 1978.]

Preamble. Whereas the Province of British Columbia is favoured with a wide variation of climate and topography resulting in a multiplicity of biogeoclimatic zones:

And whereas it is considered highly desirable in the public interest to set aside and reserve areas of Crown land representative of distinctive ecosystems for present and future scientific study:

And whereas it is the intention of this Legislature that one hundred such areas be selected and reserved for this purpose by the end of the year 1975:

Now, therefore, Her Majesty, by and with the advice and consent of the Legislative Assembly of the Province of British Columbia, enacts as follows:—

Interpretation. **1.** In this Act, unless the context otherwise requires,

(*a*) " disposition " means and includes every act of the Crown whereby Crown land, mines, minerals, coal, petroleum, natural gas, timber, and water, or any right, title, interest, or estate therein are granted, disposed of, or affected, or by which the Crown divests itself of, or creates a right, title, interest, or estate in, or permits the use of land, mines, minerals, coal, petroleum, natural gas, timber, and water;

(*b*) " ecology " means the study of the interrelations between man, or other animals, or plants, and their environment, and " ecological " has a similar meaning;

(*c*) " ecosystem " means a complete system composed of man, other animals, and plants in a defined area, together with the soil and climate comprising their habitat in that area;

(*d*) " environment " means all the external conditions or influences under which man, animals, and plants live or are developed;

(*e*) " habitat " means that kind of place or situation in which a man, animal, or a plant lives; and

(*f*) " minister " means the Minister of the Environment.

1971, c. 16, s. 1; 1977, c. 75, s. 3 (proc. eff. Oct. 21, 1977).

Purpose. **2.** The purpose of this Act is to reserve Crown land for ecological purposes, including

(*a*) areas suitable for scientific research and educational purposes associated with studies in productivity and other aspects of the natural environment;

(*b*) areas that are representative examples of natural ecosystems within the Province;

(*c*) areas that serve as examples of ecosystems that have been modified by man and that offer an opportunity to study the recovery of the natural ecosystem from such modification;

(*d*) areas in which rare or endangered native plants and animals in their natural habitat may be preserved; and

(*e*) areas that contain unique and rare examples of botanical, zoological, or geological phenomena.

1971, c. 16, s. 2.

Lieutenant-Governor to establish reserves.

3. The Lieutenant-Governor in Council may, by notice signed by the minister and published in the Gazette, establish ecological reserves of Crown land.

1971, c. 16, s. 3.

Lieutenant-Governor to cancel or amend reserves.

4. The Lieutenant-Governor in Council may, by notice signed by the minister and published in the Gazette, add to, or cancel in its entirety, or delete any portion of an ecological reserve established under section 3.

1971, c. 16, s. 4.

Ecological reserves not available for disposition under any other Acts.

5. On the coming into force of this Act, any area thereafter established as an ecological reserve under this Act shall be immediately withdrawn and reserved from any further disposition that might otherwise be granted under the provisions of any Act or law in force in the Province, including, without limiting the generality of the foregoing, dispositions under the *Land Act, Ministry of Forests Act, Grazing Act, Water Act, Mineral Act, Placer-mining Act, Coal Act, Petroleum and Natural Gas Act, 1965, Water Resources Act*, or *Mines Rights-of-way Act*.

1971, c. 16, s. 5; 1977, c. 75, s. 13 (proc. eff. Oct. 21, 1977).

Nature conservancy as ecological reserve.

6. A nature conservancy, or any portion thereof, now or hereafter designated as such under the *Park Act* may, notwithstanding that Act, be established as an ecological reserve under this Act.

1971, c. 16, s. 6.

Regulations.

7. For the purpose of carrying out the provisions of this Act according to their intent, the Lieutenant-Governor in Council may make such regulations and orders as are ancillary thereto and not inconsistent therewith and as are considered necessary or advisable; and every regulation or order made under this section shall be deemed part of the Act and has the force of law; and, without limiting the generality of the foregoing, may make regulations

(*a*) respecting the control, restriction, or prohibition of any kind of use, development, or occupation of the land or of any of the natural resources in an ecological reserve;

(*b*) respecting the control, restriction, or prohibition of the exercise of any power granted by any other Act or regulation by a minister, ministry of the Government, or agent of the Crown specified in the regulations;

(*c*) respecting the control, restriction, or prohibition of the dumping, deposit, or emission within an ecological reserve of any substance; and

(*d*) respecting, generally, any other matter or thing necessary or incidental to the protection of an ecological reserve.
1971, c. 16, s. 7; 1977, c. 75, s. 1 (proc. eff. Oct. 21, 1977).

Administration. **8.** Land established as an ecological reserve under this Act shall, subject to the regulations and orders made under this Act, be under the jurisdiction of and shall be administered by the minister.
1971, c. 16, s. 8.

Advisers. **9.** The minister may appoint a person or persons to advise him respecting any matter relating to the establishment and administration of ecological reserves, and a person appointed under this section shall have the duties prescribed by the minister and shall be subject to the regulations made under this Act.
1971, c. 16, s. 9.

Other Acts. **10.** This Act, and any regulation or order made under this Act, applies to every ecological reserve, notwithstanding any other Act or regulation.
1971, c. 16, s. 10.

Printed by K. M. MACDONALD, Printer to the Queen's Most Excellent Majesty
in right of the Province of British Columbia.
1978

B.C. Reg. 335/75 Filed April 28, 1975

ECOLOGICAL RESERVES ACT

ORDER IN COUNCIL 1456, APPROVED AND ORDERED APRIL 24, 1975

Pursuant to the *Ecological Reserves Act*, and upon the recommendation of the undersigned, the Administrator, by and with the advice and consent of the Executive Council, orders that regulations be adopted in the form attached.

REGULATIONS FOR
ECOLOGICAL RESERVES IN BRITISH COLUMBIA

1. No person shall enter upon an ecological reserve for a purpose inconsistent with the *Ecological Reserves Act*, and without limiting the generality of the foregoing, no person shall prospect for minerals, cut timber, allow domesticated animals to graze, camp, light fires, trap or molest animals, build roads or trails, use motorized vehicles within an ecological reserve, or remove plants, animals or material from an ecological reserve.

2. Research or educational use of an ecological reserve may be undertaken only when authorized by permit issued pursuant to these regulations.

3. The Administrator of Ecological Reserves may, by permit, authorize the use of an ecological reserve for research or educational purposes. The Administrator shall include in each permit issued under this section conditions that, in his opinion, are adequate to protect the reserve and any ongoing research from disruption; provided however that minimally disruptive procedures, such as collection of some plant and animal specimens, soil samples, and the like, may be specifically permitted.

4. The Administrator may not issue a permit authorizing research or educational use of a reserve that is likely to cause any significant disruption within the reserve without first consulting the Advisory Committee. After he has consulted with the Advisory Committee, the Administrator may issue a permit authorizing such research and containing such conditions as he deems advisable for the protection of the reserve and any ongoing research.

5. An application for a permit under section 2 and 3 shall contain the following information:

(*a*) A description of the proposed use;
(*b*) a description of the areas of land to be affected, with an accompanying map;
(*c*) a description of the means of access to be used;
(*d*) the duration of the proposed use;
(*e*) the ecological impact of any activities that will be undertaken within the reserve under the permit;
(*f*) the number of individuals that will be entering the reserve under the permit and, where possible, their name;
(*g*) the name of the individual who will direct the proposed research or educational programme.

B.C. Reg. 335/75

6. Permits issued under sections 3 and 4 may be limited to one entry or may cover a specified period of time.

7. The Minister may, by order, close any reserve or portion thereof, to any or all uses or entry for a specified period of time, and the Minister may, by order, permit limited camping, hunting, fishing and use of motorized vehicles in any reserve or portion thereof, providing no significant disruption results to the reserve or to any research which may be in progress.

8. No person shall introduce into an ecological reserve any plant or animal species without the written permission of the Administrator.

9. Subject to the terms of a permit, no person shall deposit, discharge, or emit sewage, waste materials, contaminants, or any other substance within the boundaries of an ecological reserve.

10. Upon completion of any research project authorized under sections 3 or 4, the permittee shall, within six months, file a report with the Administrator including, if applicable:

(*a*) A statement of the methodology used in the research;
(*b*) an inventory of any plants or animals identified during the research;
(*c*) a description of land forms and soil conditions in the research area; and
(*d*) a statement of the results obtained, and any conclusions or recommendations reached as a result of the research.

11 (1). The Administrator may, by order, cancel or modify any permit where he considers such action advisable because

(*a*) a conflict has arisen between users;
(*b*) the activities authorized by the permit may cause, or have caused, unauthorized or unanticipated damage to the reserve;
(*c*) a beneficial use is not being, or has not been, made of the permit;
(*d*) the terms or conditions of the permit have been broken, or these regulations have been violated by the permittee or his agents.

11 (2). The Administrator is not required to conduct a hearing before issuing an order under subsection 11 (1).

11 (3). The permittee may appeal any order issued by the Administrator under subsection 11 (1) to the Minister by notifying the Minister and the Administrator of his intention to appeal within thirty days of having received the Administrator's order.

R. A. WILLIAMS
Minister of Lands, Forests, and Water Resources

D. BARRETT
Presiding Member of the Executive Council

my13—7555

APPENDIX B. BIOGEOCLIMATIC ZONES OF BRITISH COLUMBIA
(B.C. Forest Service System)

Name of Zone (Abbreviation)	Climate	Location and Distribution	Major Tree Species
Alpine Tundra (AT)	Long, very cold winters and very short, cool growing seasons. Periglacial processes common.	All high elevations in the province, between unvegetated ice, snow and rock environments, and the subalpine forests. Lower limits varying from 600 m on the outer NW coast to 1800 m in the southern Rockies.	None
Spruce - Willow - Birch (SWB)	Cold, continental subalpine climate similar to the above; permafrost still possible on north slopes and in boggy depressions.	Located above the boreal forest (BWBS Zone) and below the AT Zone; replacing the ESSF Zone as subalpine zone N of about 57° Lat. Elevation range in British Columbia 900 - 1700 m.	White spruce, subalpine fir, lodgepole pine, black spruce, and aspen.
Boreal White and Black Spruce (BWBS)	Continental climate with very cold winters and short, moderately warm summers; still some permafrost in boggy depressions. Extensive forest fires common.	The boreal forest, occupying the lowest elevations in the northwestern quarter and the northeastern third of the province. Largest zone in B.C.	White spruce, black spruce, lodgepole pine, aspen, subalpine fir, tamarack, balsam poplar, birch.
Sub-boreal Spruce (SBS)	Continental climate with cold, snowy winters and short, warm summers. Forest fires common.	Occupying the entire central interior area of the province at low and middle elevations; below the ESSF Zone and generally N of the IDF, ICH and MS Zones.	Hybrid spruce (*Picea engelmannii* x *glauca*), white spruce, lodgepole pine, aspen, subalpine fir, black cottonwood, Douglas-fir.
Mountain Hemlock (MH)	Maritime subalpine climate with short growing seasons and winters with very high snow accumulations which prevent severe freezing of the ground.	Subalpine zone west of the Cascade/Coast Mountains divide. Above 400 m in the north and along the outer coast, and 1000 m in the south; reaching 1700 m in the Cascades.	Mountain hemlock, yellow cedar, and (in the south) amabilis fir; subalpine fir and whitebark pine in the transitional areas only; shore pine on the outer coast.
Engelmann Spruce - Subalpine Fir (ESSF)	Continental subalpine climate with cold, snowy winters and short, moderately warm summers.	In all interior mountain ranges south of about 57° Lat. and on the east slope of the Coast/Cascade Mountains.	Engelmann spruce, subalpine fir, lodgepole pine, whitebark pine, alpine larch (in S), mountain hemlock only in Cariboo/Monashee and Selkirk Mountains.

Name of Zone (Abbreviation)	Climate	Location and Distribution	Major Tree Species
Montane Spruce (MS)	Continental climate intermediate between that of ESSF and IDF Zones. Cold, dry winters and moderately warm periodically humid summers.	Interior zone which occurs between 1200 and 1700 m elevation, primarily on plateaus. It is located generally south of the SBS Zone, to which it has affinities. One of the four smallest zones.	Characterized by large seral stands of fire-induced lodgepole pine. Climax species are hybrid spruce, Engelmann spruce, and subalpine fir. Douglas-fir, western larch and western white pine locally common.
Ponderosa Pine (PP)	The driest, hottest of the interior forested zones. Winters dry and moderately cold. Forest fires common.	Low valleys of the Fraser-Thompson, Similkameen and Okanagan systems. Upper limits approximately 800 m. Smallest zone in the province.	Ponderosa pine; in moist draws aspen, Douglas-fir, paper and western birch. Locally western larch; black cottonwood on alluvial sites.
Bunchgrass (BG)	Very dry, continental climate with dry, cold winters and warm summers.	Lowest elevations within the range of the PP and IDF Zones. Small extent.	Ponderosa pine scattered; aspen, Douglas-fir, black cottonwood, paper and western birch in draws.
Interior Douglas-fir (IDF)	Relatively warm, dry interior climate with moderately cold winters.	Southern third of province anywhere east of the Cascade/Coast Mountains, including the Rocky Mountain Trench; generally commencing above the PP and ending below the MS Zone (300-1400 m).	Douglas-fir, lodgepole pine, aspen, hybrid spruce; locally western larch, ponderosa pine, western redcedar (moister sites), grand fir, white spruce.
Coastal Douglas-fir (CDF)	Mild coastal climate with rainy winters and dry summers; long growing season, but interrupted by summer drought.	In coastal rainshadow areas, surrounding the enclosed waters of Georgia Strait. Generally below 400 m elevation. Relatively small extent.	Douglas-fir, western redcedar, grand fir, broadleaf maple, arbutus, shore pine, red alder; Garry oak only in the driest core of the zone.
Interior Cedar - Hemlock (ICH)	"Interior wet-belt" climate. Moderately cold, wet and snowy winters and hot, often humid summers. Wettest interior zone with long growing season.	At low and lower mid-elevations on the west slopes and in valleys of all interior mountain ranges from Cariboo/Monashee chain E to the Rockies. Disjunct portion in the middle Iskut, Nass and Skeena drainages.	Greatest diversity of trees in B.C. Always dominating are western hemlock and western red cedar. Local and seral in the south are Douglas-fir, western larch, grand fir, western white pine. White, Engelmann (and in the N Sitka) hybrid spruces, subalpine fir and lodgepole pine throughout under suitable edaphic conditions.
Coastal Western Hemlock (CWH)	Mild, rainy coastal climate with relatively cool summers. Summer dry season less than in CDF and near-absent in the northwest. Long growing season.	All coastal low elevations, except around Georgia Strait. Upper limit 300 m in the north and 1000 m in the south, succeeded above by MH Zone. Also occuring above CDF Zone in the south.	Most common throughout are western hemlock and western redcedar. Sitka spruce, yellow cedar, and shore pine most common in the NW and amabilis fir, Douglas-fir in the SE of the zone; red alder in moist and disturbed situations throughout.

APPENDIX C - Representation of biogeoclimatic zones in British Columbia Ecological Reserves

Biogeoclimatic Zone[1]	Ecological Reserve Number[2]
1. Alpine Tundra	(2), 31, 32, 34, 39, (43), (45), 46, (49), 56, (57), 59, 64, 68, 70, 114, 115
2. Spruce - Willow - Birch	46, 57, 68, 80
3. Boreal White and Black Spruce	8, 47*, 50, 57, 58, 62, 80, 102
4. Sub-Boreal Spruce	(35), 36, 38, 41, 53, 55, 60, 71, 72, 73, 79, 81, 82*, 84, 85, 86, 87, 91, 107
5. Mountain Hemlock	2, 45, 83, 114, 115, 117
6. Engelmann Spruce - Subalpine Fir	31, 32, 34, (36), (38), 41, 43, 49, 56, 59, 64, 70, 78, 85, 88, 107
7. Montane Spruce	5, 6, 19, 26, 51, 88, 104
8. Ponderosa Pine	3, 7, (27), 29, 77, 92, 110
9. Bunchgrass	(3), (29), 33, 100, 110
10. Interior Douglas Fir	3, (7), 20, 21, 22, (26), 27, 29, 30, 35, 51, 65, 77, 88, (89), 101, 106, 108
11. Coastal Douglas Fir	(2), 4, 15, 16, 17*, 18*, (28), 37, 48, 74, 94*, 97*, 112
12. Interior Cedar - Hemlock	(30), 31, 42*, 43, 56, 61
13. Coastal Western Hemlock	1*, 2, 9, 10, 11*, 12, 13*, 14*, 23, 24*, 25, 28, 40, 44, 45, 48, 52, 54, 59, 63, 69, 75, 76, 89, 90, 93, 95, 96*, 98, 99*, 103, 105, 106, 109, 113, 114, 115, 116

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[1] follows classification used by B.C. Ministry of Forests and Lands

[2] reserves consisting entirely of intertidal/subtidal environments (66, 67, 111) are excluded

() indicates that zonal vegetation of this category is only marginally represented

* reserves occurring in zones defined by their forest vegetation but having non-forest cover over most of their land area, e.g. bogs, fens, shrubland, maritime meadows, or bare rock

APPENDIX D - List of common and scientific names of vascular plants referred to in reserve descriptions[1]

COMMON NAME	SCIENTIFIC NAME
agrimony, grooved*	*Agrimonia striata*
alder, mountain	*Alnus incana* ssp. *tenuifolia*
alder, red	*Alnus rubra*
alder, Sitka	*Alnus viridis* ssp. *sinuata*
alkaligrass, dwarf	*Puccinellia pumila*
alkaligrass, Nuttall's	*Puccinellia nuttalliana*
alpine-azalea	*Loiseleuria procumbens*
alpine-wintergreen*	*Gaultheria humifusa*
alumroot, round-leaved	*Heuchera cylindrica*
anemone, cut-leaved	*Anemone multifida*
angelica, seacoast	*Angelica lucida*
angelica, sharptooth*	*Angelica arguta*
antelope brush	*Purshia tridentata*
arbutus	*Arbutus menziesii*
arnica, heart-leaved	*Arnica cordifolia*
arnica, mountain	*Arnica latifolia*
arrow-grass, seaside	*Triglochin maritimum*
aspen, trembling	*Populus tremuloides*
asphodel, sticky false	*Tofieldia glutinosa*
aster, boreal	*Aster borealis*
aster, fringed	*Aster ciliolatus*
aster, leafy	*Aster foliaceus*
aster, Olympic Mountain*	*Aster paucicapitatus*
aster, showy	*Aster conspicuus*
aster, white prairie	*Aster pansus*
aster, white-topped*	*Aster curtus*
azalea, false	*Menziesia ferruginea*
balsam-root, arrow-leaved	*Balsamorhiza sagittata*
balsam-root, deltoid*	*Balsamorhiza deltoidea*
barley, foxtail	*Hordeum jubatum*
barley, meadow	*Hordeum brachyantherum*
beak-rush	*Rhynchospora alba*
bearberry, red	*Arctostaphylos rubra*
bedstraw, northern	*Galium boreale*
bedstraw, sweet-scented	*Galium triflorum*
bentgrass, Alaska	*Agrostis aequivalvis*
birch, paper	*Betula papyrifera*
birch, scrub	*Betula glandulosa*
birch, water	*Betula occidentalis*
bitterroot	*Lewisia rediviva*
bladderwort, greater	*Utricularia vulgaris*
bleeding heart	*Dicentra formosa*
blinks	*Montia fontana*
bluebells, tall	*Mertensia paniculata*
blueberry, Alaskan	*Vaccinium alaskaense*
blueberry, bog	*Vaccinium uliginosum*

blueberry, dwarf	*Vaccinium caespitosum*
blueberry, oval-leaved	*Vaccinium ovalifolium*
blueberry, velvet-leaved	*Vaccinium myrtilloides*
bluegrass, alkali	*Poa juncifolia*
bluegrass, annual	*Poa annua*
bluegrass, Howell's*	*Poa howellii*
bluegrass, Kentucky	*Poa pratensis*
bluegrass, Sandberg's	*Poa sandbergii*
bluegrass, seashore*	*Poa douglasii* ssp. *macrantha*
bluejoint	*Calamagrostis canadensis*
bog-laurel	*Kalmia microphylla* ssp. *occidentalis*
bog-orchid, green-flowered	*Platanthera hyperborea*
bramble, five-leaved	*Rubus pedatus*
brome, Alaska	*Bromus sitchensis*
brome, soft	*Bromus mollis*
broom, scotch	*Cytisus scoparius*
brown-eyed Susan	*Gaillardia aristata*
buckbean	*Menyanthes trifoliata*
bugbane, false	*Trautvetteria caroliniensis*
bulrush, great	*Scirpus lacustris*
bunchberry	*Cornus canadensis*
bur-reed, narrow-leaved	*Sparganium emersum* var. *angustifolium*
burnet, great	*Sanguisorba officinalis*
buttercup, California*	*Ranunculus californicus*
buttercup, far-northern	*Ranunculus hyperboreus*
buttercup, Lapland	*Ranunculus lapponicus*
buttercup, sagebrush	*Ranunculus glaberrimus*
buttercup, spear-leaved	*Ranunculus reptans*
buttercup, sulphur*	*Ranunculus sulphureus*
buttercup, western	*Ranunculus occidentalis*
butterweed, Canadian	*Senecio pauperculus*
butterwort	*Pinguicula vulgaris*
cactus, brittle	*Opuntia fragilis*
cactus, prickly pear	*Opuntia* sp
calla, wild	*Calla palustris*
camas, great	*Camassia leichtlinii*
cascara	*Rhamnus purshianus*
cattail	*Typha latifolia*
ceanothus, redstem	*Ceanothus velutinus*
cherry, bitter	*Prunus emarginata*
cherry, choke	*Prunus virginiana*
chickweed, field	*Cerastium arvense*
cinquefoil, five-leaved*	*Potentilla quinquefolia*
cinquefoil, marsh	*Potentilla palustris*
cinquefoil, one-flowered	*Potentilla uniflora*
cinquefoil, shrubby	*Potentilla fruticosa*
cinquefoil, sticky	*Potentilla glandulosa*
cinquefoil, villous	*Potentilla villosa*
clematis, white	*Clematis ligusticifolia*
cliff-brake, purple*	*Pellaea atropurpurea*

cliff-brake, smooth	*Pellaea glabella*
cloudberry	*Rubus chamaemorus*
clover	*Trifolium* sp
club-moss, alpine	*Lycopodium alpinum*
club-moss, bog	*Lycopodiella inundata*
colt's-foot, palmate	*Petasites palmatus*
colt's-foot, sweet	*Petasites frigidus*
columbine, red	*Aquilegia formosa*
comandra, pale	*Comandra umbellata*
coontail	*Ceratophyllum demersum*
copperbrush	*Cladothamnus pyroliflorus*
cotton-grass	*Eriophorum* sp
cottonwood, black	*Populus balsamifera* ssp. *trichocarpa*
cow-parsnip	*Heracleum sphondylium*
cow-wheat	*Melampyrum lineare*
crab apple, Pacific	*Malus fusca*
cranberry, bog	*Vaccinium oxycoccos*
cranberry, dwarf bog	*Vaccinium microcarpum*
crowberry	*Empetrum nigrum*
currant, skunk	*Ribes glandulosum*
currant, stink	*Ribes bracteosum*
daisy, cut-leaved	*Erigeron compositus*
daisy, subalpine	*Erigeron peregrinus*
death-camas	*Zigadenus venenosus*
death-camas, mountain	*Zigadenus elegans*
deer-cabbage	*Fauria crista-galli*
deer-grass, Hudson Bay	*Trichophorum alpinum*
deer-grass, tufted	*Trichophorum cespitosum*
desert-parsley, fern-leaved	*Lomatium dissectum*
desert-parsley, large-fruited	*Lomatium macrocarpum*
devil's club	*Oplopanax horridus*
dogwood, flowering	*Cornus nuttallii*
dogwood, red-osier	*Cornus sericea*
douglasia, Gorman's*	*Douglasia gormanii*
dropseed, sand	*Sporobolus cryptandrus*
dune daisy, western*	*Tanacetum bipinnatum* ssp. *huronense*
elderberry, red	*Sambucus racemosa*
evening-primrose, pale*	*Oenothera pallida*
everlasting, pearly	*Anaphalis margaritacea*
fairy-candelabra, western*	*Androsace occidentalis*
fairybells, Hooker's	*Disporum hookeri*
fairybells, rough-fruited	*Disporum trachycarpum*
fairybells, Smith's	*Disporum smithii*
falsebox	*Paxistima myrsinites*
fern, adder's-tongue*	*Ophioglossum vulgatum*
fern, Anderson's sword*	*Polystichum andersonii*
fern, bracken	*Pteridium aquilinum*
fern, coastal shield	*Dryopteris arguta*
fern, crested shield*	*Dryopteris cristata*
fern, deer	*Blechnum spicant*
fern, Fees' (slender) lip*	*Cheilanthes feei*

fern, fragile	*Cystopteris fragilis*
fern, lady	*Athyrium filix-femina*
fern, leatherleaf polypody	*Polypodium scouleri*
fern, licorice	*Polypodium glycyrrhiza*
fern, mountain bladder*	*Cystopteris montana*
fern, oak	*Gymnocarpium dryopteris*
fern, ostrich	*Matteuccia struthiopteris*
fern, rattlesnake	*Botrychium virginianum*
fern, spiny wood	*Dryopteris assimilis*
fern, sword	*Polystichum munitum*
fescue, alpine	*Festuca brachyphylla*
fescue, Altai	*Festuca altaica*
fescue, crinkle-awned	*Festuca subuliflora*
fescue, Idaho	*Festuca idahoensis*
fescue, red	*Festuca rubra*
fescue, Rocky Mountain	*Festuca saximontana*
fescue, Western	*Festuca occidentalis*
fir, amabilis	*Abies amabilis*
fir, Douglas	*Pseudotsuga menziesii*
fir, grand	*Abies grandis*
fir, subalpine	*Abies lasiocarpa*
fireweed	*Epilobium angustifolium*
fleabane, line-leaved	*Erigeron linearis*
fleabane, shaggy	*Erigeron pumilus*
fleabane, trailing*	*Erigeron flagellaris*
fleabane, tufted*	*Erigeron caespitosus*
flaxflower, bicolored*	*Linanthus bicolor*
foamflower, one-leaved	*Tiarella unifoliata*
foamflower, three-leaved	*Tiarella trifoliata*
fools-onion*	*Triteleia hyacinthina*
forget-me-not	*Myosotis* sp
gentian, glaucous	*Gentiana glauca*
gentian, northern	*Gentianella amarella*
gentian, swamp	*Gentiana douglasiana*
geranium, dovefoot	*Geranium molle*
geranium, sticky	*Geranium viscosissimum*
geranium, white	*Geranium richardsonii*
ginger, wild	*Asarum caudatum*
glehnia, American*	*Glehnia littoralis* ssp. *leiocarpa*
globeflower	*Trollius laxus*
golden-aster, hair	*Heterotheca villosa*
golden-saxifrage, northern	*Chrysosplenium tetrandrum*
goldenrod, Canada	*Solidago canadensis*
goldenrod, dryland	*Solidago spathulata*
goldenrod, northern	*Solidago multiradiata*
goldenweed, Columbia*	*Haplopappus carthamoides* subsp. *carthamoides*
goldfields, hairy*	*Lasthenia minor* ssp. *maritima*
goldthread, fern-leaved	*Coptis aspleniifolia*
goldthread, three-leaved	*Coptis trifolia*
gooseberry, black	*Ribes lacustre*

grass, cheat	*Bromus tectorum*
grass, needle-and-thread	*Stipa comata*
grass-of-Parnassus, fringed	*Parnassia fimbriata*
gromwell, yellow*	*Lithospermum incisum*
groundcone, Vancouver*	*Boschniakia hookeri*
groundsel, arrowleaved	*Senecio triangularis*
groundsel, western	*Senecio integerrimus*
grouseberry	*Vaccinium scoparium*
gumweed, entire-leaved	*Grindelia integrifolia*
hackelia, blue	*Hackelia micrantha*
hackelia, many-flowered	*Hackelia floribunda*
hair-grass, mountain	*Vahlodea atropurpurea*
hairgrass, early	*Aira praecox*
hairgrass, silver	*Aira caryophyllea*
hairgrass, tufted	*Deschampsia cespitosa*
hardhack	*Spiraea douglasii*
harebell, Alaskan*	*Campanula alaskana*
harebell, common	*Campanula rotundifolia*
hazelnut	*Corylus cornuta*
hedge-nettle, swamp	*Stachys palustris*
hellebore, Indian	*Veratrum viride*
helleborine, giant*	*Epipactis gigantea*
hemlock, mountain	*Tsuga mertensiana*
hemlock, western	*Tsuga heterophylla*
hemlock-parsley, Pacific	*Conioselenum pacificum*
highbush-cranberry	*Viburnum edule*
holly-fern, Braun's	*Polystichum braunii*
horsebrush, gray*	*Tetradymia canescens*
horsetail, common	*Equisetum arvense*
horsetail, meadow	*Equisetum pratense*
horsetail, swamp	*Equisetum fluviatile*
horsetail, wood	*Equisetum sylvaticum*
huckleberry, black	*Vaccinium membranaceum*
huckleberry, blue-leaved	*Vaccinium deliciosum*
huckleberry, evergreen	*Vaccinium ovatum*
huckleberry, red	*Vaccinium parvifolium*
Indian paintbrush, alpine	*Castilleja rhexifolia*
Indian paintbrush, annual*	*Castilleja exilis*
Indian paintbrush, Elmer's*	*Castilleja elmeri*
Indian paintbrush, golden*	*Castilleja levisecta*
Indian paintbrush, sulphur	*Castilleja sulphurea*
Indian paintbrush, Thompson's	*Castilleja thompsonii*
Indian-wheat	*Plantago patagonica*
junegrass	*Koeleria macrantha*
juniper, common	*Juniperus communis*
juniper, Rocky Mountain	*Juniperus scopulorum*
kinnikinnick	*Arctostaphylos uva-ursi*
knapweed, diffuse	*Centaurea diffusa*
Labrador tea	*Ledum groenlandicum*
lady's-slipper, sparrow's egg*	*Cypripedium passerinum*
lady's-slipper, mountain*	*Cypripedium montanum*

lady's-slipper, yellow*	*Cypripedium calceolus*
larch, western	*Larix occidentalis*
larkspur, Menzies'	*Delphinium menziesii*
larkspur, upland	*Delphinium nuttallianum*
leatherleaf	*Chamaedaphne calyculata*
lemonweed	*Lithospermum ruderale*
lettuce, prickly	*Lactuca serriola*
lewisia, alpine (dwarf)*	*Lewisia pygmaea*
lilaeopsis, Western	*Lilaeopsis occidentalis*
lily, chocolate	*Fritillaria lanceolata*
lily, glacier	*Erythronium grandiflorum*
lily, mariposa	*Calochortus* sp
lily, pink fawn*	*Erythronium revolutum*
lily, tiger	*Lilium columbianum*
lily, white fawn	*Erythronium oregonum*
lily, white glacier*	*Erythronium montanum*
lily, wood*	*Lilium philadelphicum*
lily-of-the-valley, false	*Maianthemum dilatatum*
lingonberry	*Vaccinium vitis-idaea*
lobelia, Kalm's	*Lobelia kalmii*
locoweed, field*	*Oxytropis campestris* var. *jordalii*
locoweed, Huddelson's*	*Oxytropis huddelsonii*
lomatium	*Lomatium* sp
lousewort, boreal*	*Pedicularis macrodonta*
lovage, beach*	*Ligusticum scoticum* subsp. *hultenii*
lovage, Calder's*	*Ligusticum calderi*
lupine, arctic	*Lupinus arcticus*
lupine, silky	*Lupinus sericeus*
lupine, bicolored*	*Lupinus bicolor*
mannagrass, fowl	*Glyceria striata*
manzanita, bristly*	*Arctostaphylos columbiana*
maple, bigleaf	*Acer macrophyllum*
maple, Douglas	*Acer glabrum*
maple, vine	*Acer circinatum*
marsh-marigold, white	*Caltha leptosepala*
meadowrue, western	*Thalictrum occidentale*
meconella, white*	*Meconella oregana*
mertensia, sea*	*Mertensia maritima*
milk-vetch, Dalles*	*Astragalus sclerocarpus*
milk-vetch, lotus*	*Astragalus lotiflorus*
milk-vetch, timber	*Astragalus miser*
miner's-lettuce, Siberian	*Claytonia sibirica*
mint, field	*Mentha arvensis*
mistmaiden, Tracy's*	*Romanzoffia tracyi*
mitrewort, Brewer's	*Mitella breweri*
mitrewort, five-stamened	*Mitella pentandra*
mock-orange	*Philadelphus lewisii*
monkey-flower	*Mimulus* sp
montia, narrow-leaved	*Montia linearis*
moss campion	*Silene acaulis*
mountain-ash, Sitka	*Sorbus sitchensis*

mountain-ash, western	*Sorbus scopulina*
mountain-avens, entire-leaved white	*Dryas integrifolia*
mountain-avens, white	*Dryas octopetala*
mountain-heather, four-angled	*Cassiope tetragona*
mountain-heather, pink	*Phyllodoce empetriformis*
mountain-heather, white	*Cassiope mertensiana*
mountain-heather, yellow	*Phyllodoce glanduliflora*
mugwort, long-leaved*	*Artemisia longifolia*
muhlenbergia, marsh*	*Muhlenbergia glomerata*
muhlenbergia, slender	*Muhlenbergia filiformis*
needlegrass	*Stipa* sp
nettle, stinging	*Urtica dioica*
ninebark, mallow*	*Physocarpus malvaceus*
ninebark, Pacific	*Physocarpus capitatus*
oak, Garry	*Quercus garryana*
ocean-spray	*Holodiscus discolor*
old man's whiskers	*Geum triflorum*
onion, Hooker's*	*Allium acuminatum*
onion, nodding	*Allium cernuum*
onion, Olympic*	*Allium crenulatum*
oniongrass, Alaska	*Melica subulata*
oniongrass, purple*	*Melica spectabilis*
orchid, Austin's phantom*	*Cephalanthera austinae*
orchid, bog adder's-mouth*	*Hammarbya paludosa*
orchid, Chamisso's rein	*Platanthera chorisiana*
orchid, fairy slipper	*Calypso bulbosa*
orchid, fen*	*Liparis loeselii*
Oregon-grape, low	*Mahonia repens*
Oregon-grape, tall	*Mahonia aquifolium*
oyster plant	*Tragopogon dubius*
pahute weed	*Suaeda depressa*
paintbrush, red	*Castilleja miniata*
paintbrush, yellowish	*Castilleja lutescens*
partridgefoot	*Luetkea pectinata*
pasqueflower, western	*Pulsatilla occidentalis*
peavine, creamy	*Lathyrus ochroleucus*
peavine, marsh*	*Lathyrus palustris*
penstemon, small-flowered	*Penstemon procerus*
phacelia, silverleaf	*Phacelia hastata*
phacelia, thread-leaved	*Phacelia linearis*
phlox, prickly*	*Leptodactylon pungens*
phlox, long-leaved*	*Phlox longifolia*
phlox, tufted*	*Phlox caespitosa*
pine, limber*	*Pinus flexilis*
pine, lodgepole	*Pinus contorta* var. *contorta*
pine, ponderosa	*Pinus ponderosa*
pine, shore	*Pinus contorta* var. *latifolia*
pine, western white	*Pinus monticola*
pine, whitebark	*Pinus albicaulis*
pinegrass	*Calamagrostis rubescens*
pitcher plant, common*	*Sarracenia purpurea*

plantain, Alaska*	Plantago macrocarpa
plantain, sea	Plantago maritima
plantain, slender*	Plantago elongata
poison-ivy	Toxicodendron rydbergii
pondweed	Potamogeton sp
poplar, balsam	Populus balsamifera ssp. balsamifera
poppy, pale*	Papaver alboroseum
prince's pine	Chimaphila umbellata
pussytoes, low	Antennaria dimorpha
pussytoes, Nuttall's	Antennaria parvifolia
pussytoes, rosy	Antennaria microphylla
pussytoes, woolly	Antennaria lanata
queen's cup	Clintonia uniflora
quillwort, Nuttall's*	Isoetes nuttallii
rabbitbrush, Douglas'*	Chrysothamnus viscidiflorus
rabbitbush	Chrysothamnus nauseosus
ragwort, Queen Charlotte*	Senecio moresbiensis
ragwort, sweet marsh*	Senecio foetidus
raspberry, trailing	Rubus pubescens
rattlesnake-plantain	Goodyera oblongifolia
redcedar, western	Thuja plicata
reed canarygrass	Phalaris arundinacea
reed, common*	Phragmites australis
reedgrass, Pacific	Calamagrostis nutkaensis
reedgrass, slimstem small*	Calamagrostis stricta
rhododendron, Pacific*	Rhododendron macrophyllum
rhododendron, white or white-flowered	Rhododendron albiflorum
rice grass, littleseed*	Oryzopsis micrantha
rice-root, northern	Fritillaria camschatcensis
rockcress, hairy	Arabis hirsuta
rockcress, Holboell's	Arabis holboellii
rose, baldhip	Rosa gymnocarpa
rose, Nootka	Rosa nutkana
rose, prickly	Rosa acicularis
rose, wild	Rosa woodsii
rosemary, bog	Andromeda polifolia
roseroot	Sedum integrifolium
rush, arctic*	Juncus arcticus var. alaskanus
rush, Covilles'*	Juncus covillei
rush, Parry's	Juncus parryi
rush, slender	Juncus tenuis
rush, spreading	Juncus supiniformis
rush, two-flowered*	Juncus biglumis
sage, big	Artemisia tridentata
sage, mountain	Artemisia arctica
sage, pasture	Artemisia frigida
salal	Gaultheria shallon
salmonberry	Rubus spectabilis
saltgrass, alkali	Distichlis stricta
sandwort, seabeach	Honkenya peploides

sandwort, thread-leaved	Arenaria capillaris
sarsaparilla, wild	Aralia nudicaulis
Saskatoon	Amelanchier alnifolia
saxifrage, Alaska	Saxifraga ferruginea
saxifrage, grassland	Saxifraga integrifolia
saxifrage, thyme-leaved*	Saxifraga serpyllifolia
scheuchzeria	Scheuchzeria palustris
scouring-rush	Equisetum hyemale
scouring-rush, northern	Equisetum variegatum
scurvy-grass, common*	Cochlearia officinalis
sea blush	Plectritis congesta
searocket, European	Cakile maritima
sedge, beaked	Carex rostrata
sedge, big-headed*	Carex macrocephala
sedge, bigleaf*	Carex amplifolia
sedge, black alpine	Carex nigricans
sedge, cordroot	Carex chordorrhiza
sedge, Crawe's*	Carex crawei
sedge, Engelmann's*	Carex engelmannii
sedge, Gmelin's*	Carex gmelinii
sedge, Henderson's*	Carex hendersonii
sedge, lesser panicled	Carex diandra
sedge, Lyngbye's	Carex lyngbyei
sedge, Raynolds'*	Carex raynoldsii
sedge, showy	Carex spectabilis
sedge, Sitka	Carex sitchensis
sedge, slender	Carex lasiocarpa
sedge, slough	Carex obnupta
sedge, small-awned	Carex microchaeta
sedge, water	Carex aquatilis
selaginella, Wallace's	Selaginella wallacei
shootingstar	Dodecatheon sp
sibbaldia	Sibbaldia procumbens
silverweed	Potentilla anserina
single delight	Moneses uniflora
skeletonweed, narrow-leaved	Stephanomeria tenuifolia
skunk cabbage	Lysichiton americanum
skyrocket, scarlet*	Ipomopsis aggregata
smartweed, water	Polygonum amphibium
snakeroot sanicle*	Sanicula arctopoides
snowberry, common	Symphoricarpos albus
snowberry, western	Symphoricarpos occidentalis
Solomon's-seal, false	Smilacina racemosa
Solomon's-seal, star-flowered false	Smilacina stellata
soopolallie	Shepherdia canadensis
speedwell, marsh	Veronica scutellata
spike-rush, few-flowered*	Eleocharis quinqueflora
spirea, birch-leaved	Spiraea betulifolia
springbeauty, western	Claytonia lanceolata
spruce, black	Picea mariana
spruce, Engelmann	Picea engelmannii

spruce, hybrid white	*Picea glauca* x *engelmannii*
spruce, Sitka	*Picea sitchensis*
spruce, white	*Picea glauca*
St. John's-wort, western	*Hypericum formosum*
starflower, broad-leaved	*Trientalis latifolia*
steer's head*	*Dicentra uniflora*
stonecrop, lance-leaved	*Sedum lanceolatum*
stonecrop, worm-leaved	*Sedum stenopetalum*
strawberry, wild	*Fragaria virginiana*
strawberry, wood	*Fragaria vesca*
sumac	*Rhus glabra*
sundew, long-leaved	*Drosera anglica*
sundew, round-leaved	*Drosera rotundifolia*
sunflower, little*	*Helianthella uniflora*
sunflower, Nuttall's*	*Helianthus nuttallii*
sweet gale	*Myrica gale*
tamarack	*Larix laricina*
thimbleberry	*Rubus parviflorus*
thistle, Russian	*Salsola kali*
three-awn, red	*Aristida longiseta*
thrift*	*Armeria maritima*
trefoil, bird's-foot	*Lotus corniculatus*
trillium	*Trillium ovatum*
tristeum, nodding	*Trisetum cernuum*
triteleia, Howell's*	*Triteleia howellii*
triteleia, large-flowered*	*Triteleia grandiflora*
triteleia, white*	*Triteleia hyacinthina*
tumble-mustard	*Sisymbrium* sp
twinberry, black	*Lonicera involucrata*
twinberry, red	*Lonicera utahensis*
twinflower	*Linnaea borealis*
twistedstalk, clasping	*Streptopus amplexifolius*
twistedstalk, rosy	*Streptopus roseus*
twistedstalk, small	*Streptopus streptopoides*
valerian, Sitka	*Valeriana sitchensis*
vanilla leaf	*Achlys triphylla*
vernalgrass, sweet	*Anthoxanthum odoratum*
vetch, American	*Vicia americana*
violet, early blue	*Viola adunca*
violet, marsh	*Viola palustris*
violet, northern bog	*Viola nephrophylla*
violet, yellow	*Viola nuttallii*
vulpia, small*	*Vulpia microstachys*
water-hemlock, bulbous*	*Cicuta bulbifera*
water-hemlock, Mackenzie's*	*Cicuta mackenzieana*
water-milfoil	*Myriophyllum* sp
water-parsley	*Oenanthe sarmentosa*
waterleaf, Fendler's*	*Hydrophyllum fendleri*
waterlily, yellow	*Nuphar lutea*
wheatgrass, bluebunch	*Agropyron spicatum*
whitlow-grass, Austrian*	*Draba fladnizensis*

whitlow-grass, Carolina*	*Draba reptans*
whitlow-grass, gray-leaved*	*Draba cinerea*
whitlow-grass, lance-fruited*	*Draba lonchocarpa* var. *thompsonii*
whitlow-grass, northern Pacific*	*Draba hyperborea*
wildrye, blue	*Elymus glaucus*
wildrye, dune	*Elymus mollis*
willow, arctic	*Salix arctica*
willow, Barclay's	*Salix barclayi*
willow, Barratt's	*Salix barrattiana*
willow, Bebb's	*Salix bebbiana*
willow, bilberry	*Salix myrtillifolia*
willow, coyote	*Salix exigua*
willow, Drummond's	*Salix drummondiana*
willow, grey-leaved	*Salix glauca*
willow, MacKenzie's	*Salix mackenzieana*
willow, netted	*Salix reticulata*
willow, Pacific	*Salix lasiandra*
willow, polar	*Salix polaris*
willow, Raup's*	*Salix raupii*
willow, sandbar	*Salix interior*
willow, Sitka	*Salix sitchensis*
willow, snow	*Salix reticulata* ssp. *nivalis*
willow, soft-leaved	*Salix sessilifolia*
willow, tea-leaved	*Salix planifolia*
willowherb, swamp*	*Epilobium davuricum*
wintergreen, green	*Pyrola chlorantha*
wintergreen, one-sided	*Orthilia secunda*
wintergreen, pink	*Pyrola asarifolia*
wood-rush, northern*	*Luzula confusa*
woodsia, Oregon	*Woodsia glabella*
woodsia, Rocky Mountain	*Woodsia scopulina*
yarrow	*Achillea millefolium*
yarrow, false	*Chaenactis douglasii*
yellow bell	*Fritillaria pudica*
yellow-cedar	*Chamaecyparis nootkatensis*
yew, western	*Taxus brevifolia*

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[1] plant names, except for rare species, follow Meidinger, 1984, "Common names of indicator plants for British Columbia". B.C. Forest Service, Research Branch, Victoria, 58p.

*indicates a species considered to be rare in the province. Names follow Straley, G.B., R.L. Taylor and G.W. Douglas, 1985. "The rare vascular plants of British Columbia". Syllogeus No. 59. National Museums of Canada, Ottawa, 165p.

APPENDIX E - A preliminary checklist of significant natural features found in Ecological Reserves in British Columbia[1]

NATURAL FEATURES	RESERVE NUMBERS
GEOLOGY AND LANDFORM	
1. Volcanic features	
- basalt columns	55
- lava landforms	55, 64
2. Glacial/Alpine features	
- prominent esker	36
- minor eskers/drumlins/moraines	36, 58, 68, 73
- alpine glacier(s)	31, 46, 56, 68, 115
- solifluction lobes/patterned ground	39, 46, 64, 68
3. Caves/sinkholes	68, 100, 101
4. Fluvial features (major rivers)	
- bar formation/channel shifting	8, 62, 63, 76
- eroded breaks	8, 92
- island(s) in river	63, 69, 76
5. Coastal features	
- extensive sand beach	9, 10
- dunes	9, 10, 45
- sea cliffs and stacks	45, 109
- varied shoreline types	23, 25, 45, 66, 94, 95, 109
- fjord	45
- islands/islets	
- one only	1, 2, 11, 12, 13, 14, 93
- 2 - 10	17, 18, 24, 25, 45, 96, 97
- 10+	23, 25, 94, 95, 103, 109
6. Fossils	68
FRESHWATER FEATURES	
1. Complete watershed(s)	28, 31, 45, 46, 49, 56, 64, 68, 80, 88, 107, 108, 115
2. Lakes - alpine/subalpine tarns	31, 56, 88
- bog lake(s)	5, 25, 28, 45, 47, 52, 53, 58, 86
- alkaline lake(s)	3, 35
- other lakes/ponds	36, 41, 43, 45, 68, 84, 87, 108

NATURAL FEATURES	RESERVE NUMBERS
3. Mineral springs - cold	20, 42, 102
- hot	26
4. River/streams	
- enclosed reach of river	61, 75, 89, 98, 105, 113
- meandering stream(s)	9, 28, 36, 40, 41, 42, 43, 52, 53, 58, 78, 86
- mountain stream(s)	21, 26, 30, 31, 39, 43, 45, 46, 49, 56, 59, 64, 68, 80, 85, 88, 107, 114, 115
VEGETATION	
1. Three elevational zones	31, 56, 57, 59, 88, 114, 115
2. Special non-forest habitats	
- maritime shrub/meadow (islands)	1, 11, 13, 14, 18, 23, 94, 96, 103
- marsh/fen/wet meadow	25, 40, 42, 43, 47, 50, 51, 53, 58, 86, 100
- bog - coastal	9, 25, 28, 40, 45, 52, 99, 114
- interior	47, 50, 58, 71, 72, 73, 82, 91
- estuary	45, 111
- sand dune communities	9, 10
- avalanche paths	31, 32, 56, 59, 114, 115
3. Special forest types	
- alluvial deciduous forest	8, 40, 59, 62, 63, 69, 76, 89, 113
- alluvial coniferous forest	40, 45, 61, 75, 89, 98, 105
- western larch stands	6, 104
- trembling aspen stands	8, 50, 87
- paper birch stands	85
- Garry oak stands	37, 112
- arbutus stands	16
- lichen woodland	36
- subalpine parkland	34, 43, 49, 70, 88
4. Trees at edge of or outside usual range	
- ponderosa pine	22, 65
- yellow cedar	32
- Douglas fir	38, 41, 54, 60
- Engelmann spruce	46, 59
- tamarack	72, 79, 86
- Sitka spruce	98

NATURAL FEATURES	RESERVE NUMBERS
- black cottonwood	115
- various	21, 89
5. Exceptional tree size/growth site	
- white spruce	107
- Rocky Mountain juniper	4
- Sitka spruce	45, 75, 105, 114
- Douglas fir	48
- western redcedar	61, 98, 105
- tamarack	72
- lodgepole pine	91
- western larch	104
6. Recent burns	26, 81
7. Rare vascular plants	
- single species featured	
Cephalanthera austinae	116
Erythronium montanum	83
Ophioglossum vulgatum	90
Rhododendron macrophyllum	106
Erythronium revolutum	113
- orchid diversity/rarity	42, 51, 116
- several species present	4, 9, 10, 16, 20, 25, 28, 29, 33, 34, 37, 45, 47, 52, 68, 88, 94, 100, 101, 112, 117
8. Bryophyte/lichen features (rarity; diversity)	23, 36, 45, 52
9. Exceptional wildflower displays	
- Coastal	37, 83, 94, 112, 113
- Interior	34, 39, 42, 49, 51, 64, 88, 110
10. Calcicolous vegetation	20, 42, 101
11. Marine algae	24, 45, 66, 94, 95, 96, 97, 103, 109, 111
FAUNA	
1. Birds	
- seabird colonies - major	1, 11, 13, 14, 23, 44, 45, 93, 94, 95, 96, 103
- minor	12, 17, 18, 24, 25, 97, 109

NATURAL FEATURES	RESERVE NUMBERS
- nesting raptors - peregrine falcon	11, 12, 13, 44, 45, 103
- eagles	12, 13, 44, 45, 68, 93, 95, 101, 103, 109
- sandhill crane nesting	25, 42, 99?
- important waterfowl habitat	25, 35, 47, 52, 53, 86, 100
- peripheral species expected	8, 33, 100
- endemic insular races	9, 10, 45, 52
2. Mammals	
- ungulates - important populations/uses	46, 63, 64, 68, 88, 102
- key winter ranges	20, 29, 68, 81
- endemic insular race(s)	9, 10, 11, 12, 13, 45, 52, 95, 117
- peripheral species expected	33, 74, 100
- marine mammals - sea otter	109
- sea lion rookery	11, 12, 13, 96
- sea lion haulout	14, 17, 45, 97, 109
- key killer whale habitat	111
- whale migrations	96, 97, 109, 111
- rare species	109, 117
3. Herpetofauna	
- rattlesnake den	77
- reptile diversity/unusual species	6, 7, 29, 33, 100, 108
- unusual amphibian occurrence	1
4. Insects	
- type localities/first B.C. records	35, 42, 100
- other insect features	37, 52, 100
5. Marine Invertebrates	
- high species diversity	24, 45, 66, 94, 95, 96, 97, 103, 109, 111
- high benthic production	67
- accessible research area	24, 66, 94, 97
6. Fish	
- unique taxa	52
- spawning salmon	45, 75, 105

NATURAL FEATURES	RESERVE NUMBERS
CULTURAL FEATURES	
1. Prehistoric use	2, 13, 45, 92, 109
2. Historical feature(s)	13, 59

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[1] The checklist includes only obvious features that have been identified to date. Many reserves in addition to those listed probably contain, for example, fossils, several species of rare plants, or calcicolous vegetation. Some may contain features not listed in the table.